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Report on

TRAFFIC - TRANSPORTATION - PARKING

For

BACK BAY CENTER DEVELOPMENT

BOSTON, MASSACHUSETTS

Prepared For

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Chapter I

INTRODUCTION

The proposed Back Bay Center is an urban undertaking which will affect large numbers of people. It will adopt business facilities to an urban structure on an aesthetic, yet functional basis. In part it will include:

a. A forty-story office building, and three smaller office buildings;

b. A modern "all weather" midtown shopping center containing a four-story department store, and a three-story mercantile building;

c. A 750 room hotel and a motel;

d. A convention hall and exhibition building;

e. A new railroad station.

A photograph of the proposed development shown in Figure 1, shows how the development fits into the structure of the old city, and how unusual architectural attractiveness will be achieved.

The Back Bay Center is located on the site of the Boston and Albany Railroad Back Bay Yards. It is in a sense the westward extension of the quality purchasing area now fronting Boylston Street. It is the culmination of the most important locational shift in the City's retail business activity during the past twenty-five years--a shift largely attributed to increased accessibility in the Back Bay area--encouraged by improved subway services and accelerated by the relatively superior road and parking facilities available there.

Great care is being taken to make the Center readily accessible to the large numbers of people which will visit it by foot, by mass transportation, and by private automobile. Convenience and safety of travel into and about the area are paramount objectives. It is recognized that the success of the Center will have a direct relationship to accessibility features, that accessibility is requisite for marketability. The developers are fully cognizant that improper and inadequate transportation facilities would bring to the Center the same chronic problems that are now repelling people from the central business districts of most large cities, particularly Boston; that no matter how great the market potentials, nor how desirable the site may be in other respects, transportation is the key to its success. It is their basic ideology to attract the automobile back into the city by the provision of superior traffic and parking facilities.

A good transportation plan has been devised for the Center. Roadway, pedestrian ways, and transit facilities are an integral part of the over-all development. A parking area to accommodate about 6,000 cars is provided. The number equals the spaces found in central districts of many cities of over 100,000 population. There will be more parking spaces in the Back Bay Center than currently exist along curbs in the Central Retail District of Boston.[1]

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[1] In this area (bounded by School, Milk, Arch, Chauncy, Bedford, Wash., Boylston, & Tremont), there are approximately 4,000 available curb spaces and 23,000 space restrictions.

This report deals with traffic and highway factors. Every consideration has been given to basic retailing and urban planning concepts. In the preparation of the traffic plan and in the evaluation of the Back Bay Center site, the following points have been carefully studied:

1. The nature and flexibility of the adjoining road and transit patterns.
2. The travel times and relative accessibilities by auto and transit from the various communities in the trade area.
3. The present traffic flow patterns in the site environs.
4. The magnitude and orientation of the patrons of Back Bay Center (how many persons will visit the Center, by what means of travel will they come, what will be their directions of approach).
5. The relation of anticipated traffic flows to roadway capacities and to highway needs, and the development of ways to efficiently accommodate these volumes.
6. The nature of traffic circulation plans for the Center.
7. The general economic aspects involved in operating the proposed parking facilities.

Chapter II

TRAFFIC FACILITIES

Back Bay Center will occupy an area of about 30 acres. Total building area will be approximately 2,300,000 sq. ft. (gross floor area).

The Trade Area

The trade area of Back Bay Center is far-reaching. Over 1.5 million persons are within its zone of influence which includes the greater portion of the Boston Metropolitan Area. The Center will attract persons from all of the various communities which comprise the City of Boston as well as many of the adjoining suburbs.

The trade area as defined by the market analyst, Kenneth Welch, may be delimited by a circular arc bounding Revere, Malden and Medford on the north, enclosing Waltham and Newton on the west, and encompassing Roxbury and Hyde Park (Boston) on the south. Principal roadways in the trade area are shown in Figure 2. The importance of highway facilities is readily apparent.

Existing Roadways

Back Bay Center is strategically located with regard to existing land use and transportation patterns. Unlike the central business district, it is not a focal point for the convergence of trafficways into cowpaths. The streets in its vicinity include many high type roadways. Simple connections to principal Boston trafficways make Back Bay Center automotively accessible from all sections of the trade area. From many approaches, it can "intercept" traffic which would otherwise be destined to downtown Boston.

Huntington Avenue bounds the Center on the south. As a multilane roadway, generally divided, it extends from Copley Square, west through Newton, Wellesley, and beyond. Its junctions with Massachusetts Avenue and Jamaicaway are grade separated. Between Gainsborough Street and South Huntington Avenue, curb parking is prohibited during commuter hours to enforce two moving lanes in each direction.

Boylston Street bounds Back Bay Center on the north. It serves as an east-west distributor between the Boston Common, the Charlesgate Drives, the Fenway and Brookline Avenue. Its present width is sufficient to permit two moving lanes in each direction. Brookline Avenue, which connects with Boylston Street on the west, provides two moving lanes in each direction, and has contact with Riverway, (Route 1), and Route 9. During peak hours, curb parking is prohibited to increase the over-all efficiency of movement.

Commonwealth Avenue (U.S. Route 30) is a high capacity divided multilane highway. It extends from the Boston Common west through Brighton and Newton. At Kenmore Square it connects with Beacon Street and Brookline Avenue. Its underpass for through traffic under Massachusetts Avenue eliminates many crossing conflicts and delays.

Beacon Street provides one-way operations between Central Boston and Kenmore Square. Signals are progressively timed and multilane operations are achieved. From Kenmore Square, through Brookline to Cleveland Circle, Newton, it is a divided multi-lane roadway.

These routes provide excellent automotive trafficways to western Boston, Brookline, and adjacent suburbs. Many of these routes traverse fine residential areas and are pleasing and aesthetic drives.

The Storrow Memorial Highway (Embankment Road) is a recently completed expressway along the southern bank of the Charles River. It has diverted much traffic from Beacon Street and Commonwealth Avenue reducing route volumes and relieving traffic conditions on these streets. The roadway has contact with Charles River crossings and serves as a distributor for traffic movements. Storrow Drive will enable motorists from northeast Boston to expeditiously bypass the central business district in travelling to the Center. On the west the highway connects with Soldiers Field Road and other Metropolitan District Commission parkways; on the east it will connect with a central traffic artery, Fitzgerald Expressway.

Columbus Avenue (Mass. Route 28) is a multilane traffic facility located about a quarter of a mile to the south of the Boston Center site. The route serves such southern Boston communities as Roxbury, Jamaica Plain and Dorchester. Seaver Street connects Columbus Avenue with Blue Hill Avenue, a major highway to points south.

Massachusetts Avenue is the principal north-south route in proximity of the Boston Center. As a "crosstown" distributor it extends from the Colonial Parkway on the south, over the Charles River on the Harvard Bridge, and then through Cambridge to connect with State Routes 2, 3, and 16 to the north. Multilane operations are achieved along many sections of the route.

There are many local streets which significantly increase the over-all accessibility of the Center. Some during peak hours serve as alternate routes for major thoroughfares; some currently operate as one-way streets. Exeter, Fairfield and Gloucester Streets will have direct contact into the Back Bay Center and will efficiently connect Commonwealth Avenue, Beacon Street and Storrow Drive with the development. Currently, they are lightly used, even during peak hours.

Arlington, Berkeley, and Clarendon Streets currently provide one-way operations in the environs of the Back Bay Center. With Dartmouth Street, they are to be developed as one-way crosstown surface distributors between Storrow Drive and the extension of the Central Traffic Artery.

Proposed Routes

The automotive attractiveness of the Back Bay Center is increased when highway plans for the Boston area are considered.

The Fitzgerald Expressway (Central Traffic Artery) is now under construction between the Mystic River Bridge Approaches, Charlestown, and Oliver Street, Central Boston. This limited access roadway is scheduled to be in operation at about the time Back Bay Center is opened.[2]

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[2] The section of expressway between the Mystic River Bridge and North Station (Storrow Drive interchange) is scheduled for completion by the end of 1954. The section between North Station and Oliver Street should be in operation before the end of 1955.

The expressway, which in central Boston will also have a surface distributional roadway, will connect the Sumner tunnel and the Mystic River Bridge with Storrow Drive. It will be a great asset in quickly bringing motorists to the Center as it will enable patrons travelling from eastern and northeastern metropolitan Boston to very readily bypass the central business district.

The planned Charlesgate expressway between Storrow Drive and Boylston Street will eliminate many vehicular conflicts currently experienced at intersections of the Charlesgate Drives with Beacon Street and Commonwealth Avenue. This limited access connector will significantly increase the flexibility of the street net to the northwest of the Back Bay Center.

That a progressive approach is being taken by concerned officials in dealing with traffic bottleneck locations in the greater Boston area is quite apparent. Sullivan Square has recently been reconstructed to expressway standards and will eventually be linked into the new Charles River Bridge of the Fitzgerald Expressway. The Metropolitan District Commission has installed a new overpass on Arborway at Forest Hills (Washington Street) and the route is being developed to expressway standards. The parkway leads directly to Back Bay Center via Jamaicaway, Brookline Avenue and Boylston Street.

An analysis of the Master Highway Plan for the Metropolitan area reveals that the new expressways will provide a complete service between the Center and all sections of the Boston Metropolitan Area.

Travel Times

Travel times from the various communities in the trade area to the Back Bay Center were determined. Figure 2 shows two minute isochromes for off-peak average afternoon traffic conditions. Driving times have assumed ready access from north-south streets to the Storrow Memorial Highway, the development of the Charlesgate Expressway connector, the grade separation of Boylston Street at Massachusetts Avenue, and the operation of the Fitzgerald Expressway between the Mystic River Bridge and the Sumner tunnel with interchange to Storrow Drive. Without these improvements, the time values indicated would be slightly increased.

It is apparent that the Back Bay Center may be reached more quickly by automobile from many portions of the Boston Metropolitan Area than the Central Business District. All of the market can easily reach the Center within a half hour. Route 128, the circumferential expressway around greater Boston is only 25 minutes distant from the Back Bay Center.

High speed levels on Storrow Drive reduce spatial impediveness along the Charles River. By this expressway's connection with Metropolitan District Commission parkways, driving times to many district regions are reduced. Limited access roadways permit motorists from East Boston, Chelsea, and Everett to quickly reach the Back Bay Center. On the other hand, traversing through the central business district over existing streets it takes as long as 10 minutes to reach the Center from points under two miles away.

The ease by which Back Bay Center may be reached from the west is apparent. Very favorable time distance relationships prevail on Brookline Avenue, and Jamaicaway. Via Commonwealth Avenue, Beacon Street, and Route 9 (Huntington Avenue extended) patrons from nearby suburbs can come quickly to the Center.

As the Metropolitan District Commission increasingly improves and extends its parkways, travel times to many outlying areas will be reduced and overall accessibility to the Back Bay Center made more attractive.

Transit Accessibility

Existing transit routes provide attractive accessibility to the Center. The general pattern of transit service in the Boston area (operated by the Metropolitan Transit Authority) is shown in Figure 3. The travel times shown are for average mid-day transit operations. The value and utility of the rapid transit lines is obvious - they increase the accessibility of many outlying areas in South Dorchester, East Boston, and Charlestown.

Two street car subways in Boylston Street and Huntington Avenue will directly serve the Center. These surface-subway rapid transit lines will quickly and conveniently bring persons in western Boston, Brookline and Watertown to the Center. During an average mid-day hour approximately 40 trains, many multiple units, now pass the site in each direction. With these subway lines, the Center is only about 5 minutes running time from direct connections with the Cambridge-Dorchester, Forest Hills-Everett (Washington Street and East Boston Rapid transit lines). Many surface lines feed these routes.

Existing surface bus routes on Massachusetts Avenue, Boylston Street and Newton Street will also advantageously bring transit riders to the Center. In addition, buses operating on the Worcester Turnpike (Route 9) pass the site. Transit routes in the environs of Back Bay Center are presented in Table I.

Table I

TRANSIT ROUTES

Subway Lines	Route No.	Terminals	Trains: Midday Hour
In Boylston St.			
-	61	Cleveland Circle-Lechmere via Beacon	10
-	62	Boston College-Lechmere via Commonwealth	10
-	69	Watertown-Park Street via Commonwealth Brighton	8
In Huntington Ave.			
-	39	Arborway-Park Street	8
-	57	Heath & South Huntington-Park St.	6

Bus Routes	Route No.	Terminals
Via Boylston St.		
-	54	Massachusetts Station-Bowdoin Station
-	55	Massachusetts Station-Jersey & Queensbury
Via Massachusetts Avenue		
-	47	Massachusetts Station-Dudley Station
-	76	Massachusetts Station-Harvard Square
Via Newton and Huntington		
-	68	East Concord and Harrison-Copley Square

Retrospect

The Back Bay Center site now has good accessibility. It is easily reached over existing roadways from all the communities which comprise the trade area, the greatest part of the Metropolitan region. Route developments now under construction further enhance this automotive accessibility. The pattern of transit services in the Boston area provides convenient and easy access. This access is mainly achieved by the surface-subway routes which pass the site.

Chapter III

EXISTING TRAFFIC CONDITIONS

Traffic conditions on all roadways in the vicinity of the Back Bay Center, and on principal feeder routes were examined. Field counts and observations were supplemented by data procured from public officials. Inspection of the site reveals that the Center is well situated trafficwise.

Traffic Volumes

Proximity of the site to existing flows can be evaluated from average daily flows. Accordingly, Figure 4 has been prepared to show existing traffic patterns in proximity of the Center. Almost 100,000 vehicles traverse the streets surrounding the site on a typical (1953) weekday - approximately 80,000 vehicles during the hours that the retail portions of the Center will be in operation. The greatest flows occur on Huntington and Massachusetts Avenues where average daily volumes exceed 30,000 vehicles. Over 15,000 vehicles use Boylston Street. Traffic volumes on Stuart Street and Newton Street are secondary while the average daily movements on Exeter, Fairfield, Gloucester and Hereford Streets are quite minor.

In relating volumes to capacities, it is necessary that key hourly flows be determined. Traffic volumes have been studied for the two periods of the average week day when maximum total flow conditions are likely to exist in the street network surrounding the site. These times are: (1) the "peak street traffic hour" which usually occurs between 4:00 and 6:00 p.m., and (2) the "peak

Back Bay Center traffic hour-evening openings" which may be expected to occur between 7:00 and 9:00 p.m.

Existing traffic volumes during the peak street traffic hour (the p.m."rush"hour) 4:45 to 5:45 p.m. and a typical mid-evening hour, 7:30-8:30 p.m. have been summarized in Table II. It is apparent that the greatest flows occur during the rush hour and are directional in character. During the mid-evening hour volumes are somewhat less and "prevailing" directions of flow are almost indiscernible.

The westbound rush hour volume of about 1500 vehicles on Huntington Avenue is the maximum flow experienced on streets surrounding the Center. It is also the most directional. During the evening hour, as indicated, volumes on Huntington Avenue and Massachusetts Avenue are about equal and approximate 800 vehicles per hour in each direction. Traffic movements are lighter along Boylston. Because of existing one-way eastbound regulations on Boylston Street east of Clarendon Street, there is a tendency for the overall eastbound movement to exceed westbound flows at the site.

Traffic volumes shown in Table II represent hourly flows. On key radial streets, such as Huntington Avenue, 15 and 30 minute periods during the peak hour have greater intensities and create volume-capacity conditions which might be obscured when hourly volumes alone are considered. Such conditions prevail for only a part of an hour.

Pedestrian Movements

On a typical week-day there are many pedestrians in the vicinity of Back Bay Center.

Table II

PEAK TRAFFIC VOLUMES - ENVIRONS

Typical 1953 Day

	Peak Street Traffic Hour 4:45-5:45 P.M.	Evening Hour 7:30-8:30 P.M.
Boylston Street Site		
Eastbound	530	500
Westbound	660	375
Exeter Street		
Northbound	600	300
Huntington Avenue		
Eastbound	900	780
Westbound	1450	725
Massachusetts Ave. (approaching Boylston Street)		
Northbound	810	750
Southbound	1000	840
Newton Street (approaching Huntington Avenue)		
Northbound	320	275
Southbound	250	220

Recent 24-hour (two direction) pedestrian flows at nearby subway stations approximate the following values:

Massachusetts Avenue Station	45,000
Copley Square Station	26,000
Symphony Station	14,000
Mechanics Station	5,000

Over 20,000 persons traverse Boylston Street (east of the site) between Berkeley and Clarendon Streets on a typical weekday; a like number are found on Huntington Avenue at Massachusetts Avenue. Over 10,000 persons traverse Boylston west of Massachusetts Avenue. It is apparent that in terms of pedestrian flows the site is strategic.

Roadway Operations

Examination of traffic flows and roadway capacities in the streets surrounding the Center reveal that it is well situated. Greater roadway capacities exist in proximity of the site than along many other sections of the same streets; favorable traffic operations result. Field studies indicate that movements on Boylston Street, Exeter Street, and Huntington Avenue adjacent to the site, and on Commonwealth Avenue and Beacon Street nearby are fluid, even during the peak street traffic hours.

Most key intersections in the site environs are signalized as part of the Boston Traffic Commission's "Back Bay System". These signals operate on a 100 second cycle;[3] timing is generally well related to traffic demands.

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[3] The intersection of Huntington and Newton Street is an exception and operates on a 90 second cycle.

Most intersections operate on 2 vehicular phases. In addition, pedestrian intervals, either actuated ("on call") or fixed time are usually provided.

Periodic curb parking restrictions ("No Parking 8-10A.M." and/or "No Parking 4-6P.M.") are currently in effect along sections of Brookline, Columbus, Commonwealth, Huntington and Massachusetts Avenues. These peak hour prohibitions increase the number and efficiency of moving lanes thus providing much needed attitional roadway capacities.

Route Evaluations

While rush hour operations are favorable on streets at the site, it should be noted that the key streets serving the site are among the principal trafficways of the city and currently carry heavy volumes of traffic during peak hours. Evaluation of operations on principal approach routes to Back Bay Center is summarized in Table III. A discussion of details of route performance observed in the field studies is contained in Appendix I.

The analysis shows that when roadway capacities are related to peak hour volumes, saturation occurs at some locations along routes leading to the Back Bay Center; during other periods of the day, traffic volumes on these streets are well below the capacity limits. On some of the routes, while there are no accumulated delays, indicative of saturation flows, traffic volumes approach saturation values.[4]

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[4] Optimum or design capacity is a "luxury" in large urban areas, as volumes tend to be governed by possible capacity or saturation flow values.

It should be noted that saturation and congestion during peak street traffic hours are prevalent on other routes in the Boston area, often to a greater extent. The performance levels attained on routes serving the Back Bay Center can, in general, be considered quite favorable when evaluated on an urban scale. Traffic has adjusted itself well to the various routes serving the Back Bay area and the Back Bay Center. Further adjustments will occur when improvements concurrent with the construction of the Center are achieved.

Retrospect

An analysis and evaluation of existing pedestrian and vehicular volumes and roadway capacities on the streets surrounding the Back Bay Center reveal that it is well situated trafficwise. This is true even though some restrictive capacity conditions develop along principal feeder routes during peak street traffic hours.

A traffic plan which has been developed, and is described later, increases the street capacities in the vicinity of the Back Bay Center to provide adequate services for the accommodation and dispersal of vehicles using the Center. Traffic to the Center is properly considered in relation to other traffic on the streets. This plan is carefully integrated with indicated plans of public bodies for expressways, route improvements, and intersection treatments in Metropolitan Boston.

Table III

EVALUATION OF STREETS
Rush Hour Operations
Principal Approach Routes

Route & Location	(Direction of Heaviest Flows) Moving Lanes	Quality of Flow	Intersection Approach Conditions
Beacon St: (Berkeley St. to Kenmore Square)	3	Good	Kenmore Sq. (B)
Boylston St: (Dartmouth St. to Brookline Ave.)	2	Good	Massachusetts Ave. (A)
Brookline Ave: (Boylston St.-Route 9)	2	Good	Park Dr., (A), Rte. 9 (B)
Columbus Ave: (Newton St.-Roxbury Crossing	2	Good	Mass. Ave., Roxbury Cr. (C)
Roxbury Cr.-Egleston Sq.	2	Fair	Jackson St., Egleston Sq. (C)
Commonwealth Ave.-Arlington St.-Kenmore Square	2	Good	Clarendon St., Charlesgate Dr Kenmore Sq. (B)
Kenmore Square-Brighton Ave.	3	Good	Boston Univ. Bridge (C) Brighton Ave. (B)
Exeter Street	2	Good	-
Huntington Ave. Rte. 9-Copley Sq-Gainsborough	2	Good	-
Gainsborough-Washington Ave.-(Brookline)	2	Fair	Ruggles St., Brigham Circle South Huntington Ave., Brookline Ave., Washington St. (C)
Massachusetts Ave.-Charles River-Columbus Ave.	2	Poor	Boylston, Westland, Columbus (C
Columbus-Tremont	2	Fair	Tremont (B)
Newton St: Tremont-Falmouth	1	Fair	Huntington, Newton (B)
Storrow Drive-Longfellow Bridge-Soldiers Field Rd.	4	Excellent	-
Stuart St. (Dartmouth-Huntington)	1-2	Fair	Dartmouth, Huntington (B)

A - speed reductions required
B - approaching saturation
C - saturated

Chapter IV

ANTICIPATED VISITATION AND FLOW CHARACTERISTICS

Traffic volumes and conditions which might be expected when the Back Bay Center is in operation have been determined. Calculations have been developed for 1955. Consideration is given to normal traffic growths in addition to movements generated by the Center.

Growth Trends

General population trends for the Boston area in the state of Massachusetts are presented in Table IV. Since 1910 the city of Boston has been growing at a slow but steady rate, although some population declines occurred during depression years. Its 1950 population of 801,444 has exceeded previous estimates and is 4% more than the 1940 population. Growths in the Boston trade area are somewhat greater. The Boston Metropolitan Area and the State of Massachusetts have increased their populations at twice the rate of the city proper; while the population in the city of Boston might have stabilized, it is apparent that the Metropolitan area is growing.

With increases in population, there has been a marked increase in vehicular usage. Between 1940 and 1950, as shown in Table V vehicular registrations increased 40 per cent in the State of Massachusetts as compared with a population growth of less than 10 per cent. Based on state registration characteristics and Metropolitan Area population increases, it is reasonable to expect an overall traffic increase of about seven per cent between 1953 and 1955.

Table IV

POPULATION CHARACTERISTICS

Census Area	Population 1950	% Increase 1940-1950
City of Boston	801,444	4.0
Boston Center Trade Area	1,587,438	5.5
Boston Metropolitan Area	2,369,986	8.8
State of Massachusetts	4,690,514	8.7

Table V

VEHICLE REGISTRATION TRENDS

	Vehicles 1952	% Increases 1952-1950	Vehicles 1950	% Increase 1940-1950
All Vehicles	1,376,058	7.0	1,280,329	40%
Private Passenger Vehicles	1,189,133	8.0	1,098,770	41%

In projecting traffic growths, it was found that recent changes in traffic regulations and new street developments have altered normal growth patterns in the environs of the site. Insufficient parking and terminal facilities have had an impeditive effect on auto usage in the central business district.

The greatest traffic growths on routes in the vicinity of the Center have occurred along Massachusetts and Huntington Avenues. The latter street was improved in 1941 when the subway was extended to Symphony Station and the Massachusetts Avenue underpass was constructed. The opening in 1952 of the Storrow Memorial Highway has attracted vehicles otherwise previously using Beacon, Commonwealth and Boylston Streets.

Visitation Characteristics

The traffic attraction of the many diverse generators within Back Bay Center have been calculated. Visitation characteristics are summarized in Table VI.

On an average shopping day it is estimated that over 70,000 persons will visit the Center. They can be expected to arrive as follows:

By Mass. Transit and Taxi	- 57%
By Auto	- 35%
By Walking	- 8%

Approximately 30,000 vehicles can be expected to visit the Center.

It is apparent from Table VI that the largest attraction in terms of attendance, will be the retail selling area which will attract about 70% of the total number of persons visiting the Center. The other 30% will be about evenly distributed between the office buildings (12%); the railroad station, motel and hotel (10%) and the convention hall (8%).

Table VI

VISITATION, TRAFFIC AND PARKING

REQUIREMENTS -AVERAGE SHOPPING DAY

Generator	Percent of Persons	Total Persons	Auto	Walk	Mass. Transit and Taxis	Automobiles (Private Parking)	Parking Spaces	Taxis and Pick-up (No Parking)
Retails (including Super Market)	70.0	50,000	20,000	4,000	26,000	11,000	3,600	800
Hotel and Motel	2.5	1,800	900	100	800	450	300	300
Office Buildings	11.8	8,500	2,200	800	5,500	1,400	1,100	800
Railroad Station	7.3	5,200	100	100	5,000	60	50	1,000
Center Total	91.6	65,500	23,200	5,000	37,300	12,910	5,050	2,900
Convention Hall	8.4	6,000	1,800	500	3,700	1,000	1,000	1,000
Total	100.0	71,500	25,000	5,500	41,000	13,910	6,050	3,900
Percent of Persons		100.00	35.0	7.7	57.3			

It should be noted that during peak shopping periods, as would occur immediately prior to Christmas, the retail selling area will attract an even greater number of persons. Visitation on peak days should be 30 per cent greater than that experienced on average days.

The greatest activity in terms of movement can be expected to occur between 3 and 9 p.m.; retail - evening 7 to 9 p.m.; office buildings - afternoon 4 to 6 p.m.; railroad station - afternoon 4 to 6 p.m.; convention hall - evenings 7 to 10 p.m.; and hotel and motel - 3 to 7 p.m. Traffic plans for the Back Bay Center, developed in Chapters V and VI have given careful consideration to all visitation characteristics.

Orientation

The traffic generated by the retail section of the Center is directly related to the extent of the sales volume of its stores As these values consider income, car ownership, and accessibility, in addition to the population of the various communities within the trade area, sales become a better reflection of expected traffic characteristics than any of the factors considered individually. The magnitude of sales is an index of activity and will thus be proportionate to the traffic generated. Traffic magnitudes for each locality in the market area were obtained.

The distribution of patrons visiting the Back Bay Center is presented in Table VII. These orientations were developed cooperatively with the market analyst. It should be noted that the greatest proportion of persons will be attracted to the Back Bay Center from the north and west sections of its trade areas.

Table VII

ORIGINS OF SHOPPERS

From North:		21.4%
	Belmont	
	Arlington	
	Cambridge	
	Medford	
	Somerville	
From West:		34.7%
	Back Bay	
	Brighton	
	Brookline	
	Newton	
	Waltham	
From Southwest:		14.4%
	Jamaica Plain	
	Roxbury	
	West Roxbury	
	Roslindale	
From Southeast:		8.9%
	Dorchester	
	Hyde Park	
From East:		20.6%
	Chelsea	
	South Boston	
	Everett	
	Downtown Boston	
	West End	
	East Boston	
	Charlestown	
	Malden	
	Winthrop	
	Revere	
	TOTAL	100.0%

Predicated on the degree of usage of transit and automobiles by patrons in coming to the Back Bay Center, and the relative accessibilities of the various communities to the Center via these alternate means of travel, directional distributions for automobile trips and transit trips have been developed.

Automobile Distribution

The potential vehicular traffic from all communities in the Back Bay Center trade areas has been assigned to the various approach routes on the basis of driver origins and destinations; see Table VIII. Special attention was given to the area street patterns and customer road-user characteristics - customers will tend to seek out the easiest route to the Center from their origin. Traffic movements have been assigned with regard to the most direct and fluid routes of travel; relative travel times by alternate routes were carefully considered. The prevalence of vehicular flows from the north and west suburban communities is obvious.

The market data have assumed that the Fitzgerald Expressway will carry Center traffic from the Mystic River Bridge and the Sumner Tunnel into Storrow Drive. As indicated in Chapter II, this freeway should be in operation by the time the Back Bay Center is opened, and will serve as a collector for most traffic from the eastern portions of the trade area. The effectuation of basic aspects of the Center traffic plan, Chapter V, have also been assumed

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6 These are: (1) an underpass in Boylston St. at Mass. Ave., and under Huntington Ave. at Stuart St;
(2) liberal contacts with Storrow Drive;
(3) one-way street operations, northbound on Fairfield and Dartmouth Streets, southbound on Exeter and Gloucester Streets
(4) improvements of Charlesgate Drive.

Table VIII

ORIENTATION-VEHICULAR TRAFFIC GENERATED BY BACK BAY CENTER

	1	2	3	4	5	6	7	8	9	10	
Communities	Boylston (from West)	Gloucester	Exeter	Boylston (from East)	Blagden (from East)	Huntington (from East)	Stuart	Newton	Huntington (from West)	Falmouth (Mass. Ave.) (Westland)	Total
Percent:											
Arlington, Belmont, Cambridge, Medford, Somerville	4.1	14.0	10.8	0.3	0.6	0.6	0.0	0.0	0.0	0.0	30.4
Back Bay, Brighton, Brookline, Newton, Waltham, Watertown	7.1	9.8	1.0	0.0	0.0	0.0	0.0	0.3	4.2	0.1	22.5
Jamaica Plain, Roxbury, West Roxbury, Roslindale	4.1	0.0	0.0	0.0	0.0	0.0	0.0	6.9	3.4	0.3	14.7
Dorchester, Hyde Park	1.8	0.0	0.0	0.0	0.0	0.0	0.0	3.3	3.4	1.3	9.8
Downtown Boston, South Boston, West End, East Boston, Charlestown, Chelsea, Malden, Winthrop, Revere	0.2	0.0	16.3	0.8	1.4	1.4	2.5	0.0	0.0	0.0	22.6
Total: Shopping Traffic Trade Area	17.3	23.8	28.1	1.1	2.0	2.0	2.5	10.5	11.0	1.7	100.0
Total: Adjusted for traffic from outside of trade area for cabs, and non-shopper traffic	17.3	22.4	24.0	2.1	2.8	2.5	4.3	9.5	13.0	2.1	100.0

The relative magnitudes of Back Bay Center traffic and its anticipated distribution in the environs of the site are depicted in Figure 5. As would be expected, the greatest proportion of vehicles will enter the Center on its north; the amount approaching from the Central Business District is very light. This figure clearly indicates the importance of the north-south streets which serve as collectors for east-west traffic. The usage of Storrow Drive is apparent, almost one-third of all Center bound traffic will approach the site environs on this expressway. Over 25 per cent of all approaching traffic is found on Commonwealth Avenue and Boylston Street. That "West" is the principal direction of the approach is again evident. It is important to note that the nature and location of the contact points with Storrow Drive will have significant influence on the pattern of traffic distribution on the streets and the environs of the Center. In making the market assignments, as shown, liberal contacts with Storrow Drive have been assumed. Effects of varying these accesses can readily be determined from Figure 5.

In the last decade the greatest population growth in the Boston Area has been experienced in the western suburbs of Brookline Waltham and Newton. Growths in these communities have exceeded 15 per cent as compared to a metropolitan area growth of about 9 per cent. It is reasonable to expect increased settlement of these areas on a decentralized basis in the near future. Directions of approach will be accordingly effected. The development of expressways in the greater Boston area as planned, particularly the southeast and southwest routes, will decrease travel times to many communities.

The trade area will likely be extended to encompass such outlying areas as Milton, Quincy and Dedham. Also, the expressways will tend to shift patrons from transit to vehicles along their major zones of influence.

Transit Distribution

The orientation of patrons riding transit vehicles to the Back Bay Center has been determined. Consideration was given to such factors as route running times, frequency of service, and number of transfers required. Table IX relates trip origins to transit routes serving the site. Directions of approach of transit patrons are shown in Figure 6. The importance of surface-subway routes is clear. The rationality of the planned Back Bay Center Station is obvious - 73 per cent of all subway riders will use routes operating under Boylston Street at the site.

Anticipated Vehicular Flows

Anticipated automobile flow patterns were developed from the visitation data. It has been assumed that the Center would operate at its designed productivity likely on optimum condition. To anticipate the heaviest traffic, it has been assumed that an event would discharge at the Convention Hall during the peak street traffic hour, and that an event would start at the Convention Hall during the peak Center traffic hour.

Ingress and egress movements into the Center during key hourly periods are shown graphically in Figure 7. On an average week day almost 3500 vehicles can be expected to exit from the Center during peak hours. The effects of the office buildings discharging employees during the peak street traffic is obvious.

Table IX

DISTRIBUTION OF TRANSIT RIDERS

GENERATED BY BACK BAY CENTER

Approach Route

Origins	Via Bus					Via Subway				Total
	Massachusetts Station					Boylston St. 61-62-69		Huntington Ave. (39-50)		
	76 Harvard Sq.	47 Dudley Sta.	54 Jersey Boylston	55 Boylston Bowdoin	68 Newton	From West	From East	From West	From East	
Arlington, Belmont, Cambridge, Medford, Somerville	6.6						7.5		1.4	15.5
Back Bay, Brighton, Brookline, Newton, Waltham, Watertown		1.5	3.5	2.0	1.0	27.0		7.8		42.8
Dorchester, Hyde Park		2.3					4.2	0.4	1.4	8.3
Jamaica Plain, Roslindale, Roxbury, West Roxbury		5.5			2.3			6.4		14.2
Chelsea, Everett, Malden, Revere, Winthrop, Downtown, East Boston, South Boston, West End, Charlestown	—	0.7	—	2.4	—	—	13.9	—	2.2	19.2
Total Market Area	6.6	10.0	3.5	4.4	3.3	27.0	25.6	14.6	5.0	100.0
Adjusted for Non Shoppers	6.0	9.0	3.5	4.5	3.0	27.0	26.7	14.8	5.5	100.0
						Boylston 53.7		Huntington 20.3		
	Via Bus	26%				Via Subway	74%			

Entrance flows of over 4000 vehicles would develop during the peak Center traffic hour. Without the Convention Hall, total flows would be considerably less; maximum hourly movements into and out of the Center would approximate 2700 vehicles and would occur during the Back Bay Center traffic hour and the peak exit hour respectively. Peak hourly pre-Christmas flows would approximate 5,000 vehicles if the Convention Hall were holding an event, or 3,500 vehicles otherwise. These would occur during evening hours of operation. Greatest vehicular movements developed by the retail area occur during evening hours. Flows developed by the office buildings are minor except for a considerable exit flow during the peak street traffic hour. Hourly volumes generated by the railroad station, hotel and motel are negligible.

Many of the vehicles entering the Center, especially those destined for Convention Hall will be loading or unloading passengers rather than parking or unparking. Pickup vehicles have been estimated to approximate a thousand vehicles during the peak traffic hours, when the flows shown in Figure 7 are developed.

Area Traffic Volumes

The anticipated traffic volumes (Figure 7) were allocated to each approach route according to the vehicular traffic distribution previously developed (Figure 5). Traffic to the Center is related to existing highway flows projected to 1955. It is expected that some of the existing traffic will be attracted to the Center. In developing the composite flow patterns, careful consideration was given to these "diverted" volumes. Development of north-south one-way streets necessitated some reassignment of existing volumes in the area.

To graphically portray route volumes which can be anticipated during the hours of heaviest total demand, traffic flow diagrams have been prepared. By relating vehicles entering Back Bay Center on the various approaches to the functional design of the roadways within the Center, it has been possible to estimate the internal flow patterns. Traffic flows during the peak street traffic hour, 1955, are presented in Figure 8. It may be seen from this diagram that the highest directional volume occurs on Huntington Avenue westbound. This value approximates 1900 vehicles (north bound). As shown, the greatest increases in total flows occur on Boylston, Fairfield, Exeter and Gloucester Streets; a peak flow on Boylston Street of almost 1100 vehicles westbound is anticipated.

It is significant to note that traffic flows developed by Back Bay Center are relatively well distributed to all approach routes. It is fortunate, trafficwise, that much Center traffic occurs on streets where other traffic is secondary.

The pattern of internal circulation on the Ring Road through the Center has greatest values between Gloucester and Fairfield Streets, and at Newton Streets, during the peak street traffic hour. Elsewhere, the average volumes of the internal circulation system vary between 1000 to 1500 vehicles during the hour. Dispersal of traffic to the various parking areas provided in the development is evident.

The flows which might be expected to occur in 1955 during the peak Center traffic hour for evening openings are shown in Figure 9.

The total traffic movements in the streets surrounding the site are less than traffic volumes occuring at the peak street traffic hour. However, the proportion of traffic destined to the Back Bay Center is greater.

Maximum flows occur eastbound on Huntington Avenue. Total traffic loads on many approaches, such as Exeter, Fairfield and Gloucester Streets, are greater than those occurring during the peak street traffic hour. Movements within the Center itself are significantly greater. While the general internal circulation pattern is quite similar to that of the peak street traffic hour, during the peak Back Bay Center traffic hour, maximum movements on the ring road approximate 3000 vehicles per hour.

Retrospect

A study of the generating characteristics of the Back Bay Center reveal that approximately 25,000 motorists, 5,000 pedestrians, and 40,000 mass transportation riders will visit the site on an average business day. They will be a heterogeneous group with a variety of desires and demands. By the evaluation of market and population growth data, it has been possible to assign vehicular and transit flows to the various approach routes to the Center. Traffic flow diagrams have then been developed. These clearly indicate the relative importance of the street network in the environs of the site.

Chapter V

ACCESS AND CAPACITY

The transportation plan developed for the Back Bay Center has been carefully integrated into the area street system. The attractive highway access features developed will preclude interference of Center traffic with other road users.

Treatments for Immediate Environs

The general treatments in the environs of the Back Bay Center are depicted in Figure 10. A grade separation is planned to carry Boylston Street under Massachusetts Avenue. This will correct an existing bottleneck and will greatly increase street capacity in the area. Travel times through the intersection on both streets will be reduced. The grade separation will permit a readjustment of the traffic signal timing along Massachusetts Ave., particularly at Boylston Street and Westland Avenue, to accommodate increased north-south flows. Special consideration should be given to the placing of pedestrian phases "on call" where they appear every cycle. The street car tracks in Massachusetts Avenue (between Newbury Street and Columbus Avenue) are not used; it can be expected that the street will be resurfaced to improve the quality of operations.

The Charlesgate Expressway as proposed by the Master Highway Plan will be an important limited access connector between Storrow Drive and Boylston Street, The overpasses at Beacon Street and Commonwealth Avenue will advantageously eliminate existing points of congestion and improve the facility of movements on these east-west routes.

With its direct limited access connection via the Charlesgate expressway to Storrow Drive, and the projected underpass at Massachusetts Avenue, Boylston Street will become an increasingly attractive route. If in the future, congestion develops on other routes, such as Commonwealth Avenue, much Center traffic will readily be attracted to Boylston Street. It should be noted that east of the Center, traffic flow patterns on Boylston Street are heaviest eastbound. It is planned to have the roadway space allocated proportionately between Exeter and Clarendon Streets.

An underpass of Huntington Avenue near Exeter Street will provide direct and efficient entrance and exit to the Center from Huntington, Exeter and Stuart Streets. Left turning maneuvers across heavy opposing flows will not be required. An additional westbound traffic lane on Huntington Avenue during the peak street traffic hours will be achieved in the environs of the site by restricting curb parking. In addition, left turn lanes on Newton Street will also improve the flow on both streets at their intersections. To encourage the use of the proposed underpass, the eastbound left turn at Newton Street should be prohibited, at least during the peak street and Back Bay Center traffic hours. It is planned to relate the traffic signals at the intersection to those at Exeter Street to develop progressive flows along Huntington Ave.

Full use will be made of all streets around the Center. A one-way distributor system has been developed. Under one-way operations, Dartmouth, Exeter, Gloucester, and Fairfield Streets become excellent connectors between the Back Bay Center, Common-

wealth Avenue, Beacon Street and Storrow Drive.[8] Hereford Street can remain two-way, but it will serve as an additional distributor. It should be noted that the direction of traffic on Exeter Street has been reversed to conform with the city's expressway and major street plans. The one-way system will have a high capacity, and as indicated previously, will serve many persons traveling to and from the Center.

The additional contact points along Storrow Drive have been oriented to encourage direct and efficient traffic movements to the Center. The one-way street system achieves full utility in carrying Center traffic which would otherwise be required to traverse through congested areas. Motorists approaching from Cambridge over the Harvard Bridge will be able to use Storrow Drive and the one-way system in coming to the Center.

Commonwealth Avenue can easily accommodate increased loadings in the environs of the Center by the provision of three approach lanes at key intersections, particularly eastbound. This can be achieved by markings and parking controls.

It is apparent that when the Center is in operation, traffic regulations and controls in the area will be adjusted to conform with new traffic patterns.

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[8] Northbound: Dartmouth and Fairfield
Southbound: Exeter and Gloucester

The one-way system related to improved surface routes and limited access facilities develops an outstanding degree of flexibility on the approaches to the Back Bay Center. Patrons coming by auto will be able to quickly reach the development over a choice of alternate congestion-free routes.

Sufficiency of Streets

Based on the above plans, the possible capacities of all principal streets adjacent to Back Bay Center have been determined. Consideration was given to such determinate factors as the number of effective lanes, the nature and type of interferences and pertinent road user characteristics. These capacities have been compared with anticipated traffic loadings (Figures 8-9) and traffic sufficiencies determined. Approximate roadway capacities, the number of moving lanes, and the traffic sufficiency of key streets are shown graphically in Figure 11.

The traffic adequacy of the street system adjacent to the Back Bay Center is readily apparent. There are virtually no sections of roadway having capacity deficiencies.

Boylston, Huntington, Commonwealth and the north-south streets all provide capacities in excess of loadings during typica peak hours. The improved operations developed on Massachusetts Av will permit satisfactory flow on this street to the north of the Center. Capacity or saturated traffic conditions will, however, occur along Newton Street and Massachusetts Avenue south of the site. It should be noted that the Planning Commission has contemplated the widening of Newton Street as a connector to a south expressway, and that this improvement will provide the increased lane capacity required.

Route Improvements

The Master Highway Plan for the Boston Metropolitan area is shown in Figure 12. The advantageous relationship of the Center to proposed expressway developments is apparent. Planned expressways will supply additional traffic capacity throughout the trade area. New limited access routes will attract traffic now using key radial routes, reducing many peak hour loading intensities.

In addition to the expressways, Figure 12 also indicates the route and intersection treatments recommended in the master plan, as well as the few minor additional improvements that are necessary to accommodate increased route volumes generated by the Center. Virtually all key bottlenecks within a two to three mile radius of the Center have already been recommended for treatment in the Master Plan. Improvement of these locations is necessary even if Back Bay Center were not developed. The master plan has recommended corrective measures for capacity deficient sections of Columbus, Commonwealth, and Huntington Avenues.

Route traffic flows along Huntington Avenue can be expedited by improved signal installations and operations, and by simple intersection channelizations.

At the Route 9-Huntington, South Huntington Junction, the addition of a few channelizing islands, and about a 5 foot widening of the north curb will permit two effective westbound moving lanes around turning street cars. With interconnected, actuated signals, peak hour street traffic problems should be largely alleviated.

On Commonwealth Avenue, the effective removal of all curb parking at Kenmore Square will provide sufficient additional capacity when conditions so warrant. The Master Plan has recommended the installation of traffic signals at the Commonwealth Avenue-Boston University Bridge. Until this intersection is relieved by the Belt Expressway, capacities can be increased by prohibiting left turns off the bridge. An alternate route for this turning movement can be provided. It should be noted that the Master Highway Plan also calls for reconstructing Commonwealth Ave. west of the Brighton Avenue; this widening will increase the automotive attractibility of the Center from the areas along its extent

When the Forest Hills elevated line operating in Washington Street is replaced by a subway route, as planned, it will be possible to develop an attractive trafficway on the street. The new roadway will divert vehicles from alternate routes.

The widening of Newton Street to connect with the South Expressway, as contemplated by the Planning Commission is a necessary improvement. It will provide a much needed alternate crosstown route somewhat relieving volumes on Massachusetts Avenue. This route will achieve significance as the principal route to the Center from the South Expressways and the new markets developed.

Transit Plans

The Metropolitan Transit Authority is doing an excellent job in providing coordinated mass transportation services in the Boston area. Service is progressively improved; plans have been developed for extension of key rapid transit lines. These plans include an increase in track capacity of the surface-subway routes

in central Boston; this will permit an even greater number of subway trains to pass the site during peak traffic hours.

It is reasonable to expect that transit service in the environs will be adjusted to changes in demand. Possibilities exist for the through routing of buses on Boylston Street, some into the Center. Some rerouting of buses entering the Massachusetts Avenue Station will be required, as the planned grade separation at the Massachusetts-Boylston Street intersection changes the physical characteristics of the intersection.

Details of transit facilities at the site are subsequently discussed.

Resume

The traffic plans for the environs of the Back Bay Cente have many attractive accessibility features. Sufficient roadway capacities are provided on the street pattern adjacent to the Center to adequately accommodate average peak hour flows. Key route deficiencies on principal approaches to the Center have been recommended for correction in the Master Highway Plan. Planned expressways will have a favorable redistributive effect on route traffic patterns.

Chapter VI

THE TRAFFIC PLAN

A good transportation plan has been devised. It gives careful consideration to the demands of vehicles, pedestrians and transit. This is clearly shown in Figure 13. Developed cooperatively with the Boston Center Architects, the figure indicates the composite movements of automobiles, service vehicles, subways, and trains within the Center. The intricacy, yet simplicity of the comprehensive plan is evident.

The traffic plan is completely and effectively integrated into the adjoining street pattern. Its many interesting and unique features make the Center easily accessible to the mobile autoborne customer, the transit rider and the pedestrian.

Street Contacts

Traffic access points to the Center have been carefully located with regard to directions from which motorists will approach. This is readily apparent from the detailed roadway plan, Figure 14. Proper dispersion of traffic on contact roads is attained. There is full utilization of the peripheral "contact" area. From all principal approaches, motorists will have at least two opportunities to enter the Center.

The seven points of entry that have been provided are designed to "invite" and induce motorists into the Center. There are eight exits (Figure 13); these contact points will enable customers to easily and expeditiously enter and leave. Contacts are effected by steady flow deceleration or acceleration maneuvers except at the intersections of Boylston with Fairfield and Gloucester where two phase semi-actuated signals will control movements into and out of the Center.

The contact points provide high capacity to efficiently meet peak exit and entrance conditions; as previously indicated about 3500 vehicles will likely exit during peak Center traffic hours. The times to leave the Center under varying exit loads are indicated in Table X. Within a half hour 2500 vehicles can be easily cleared; if this exodus is effected in accordance with the relative exit capacities, the time to leave is even less.

The Ring Road

A one-way "ring road" skirts the site. This road is the key to the circulation plan for automotive traffic. The ring road is a sloping road. It varies in elevation as much as 17 feet, yet grades are slight and almost imperceptible; its maximum gradients are less than 5%. From a high point at the railroad near Boylston Street and Massachusetts Avenue, the road drops to a low point near Boylston and Exeter Streets. It rises again to go over the railroad at Huntington Avenue and again slopes downward past Mechanics Hall. It should be noted grades of the road follow almost exactly the existing grades along Boylston and Huntington Streets. Sufficient vertical clearances are provided. Except for at Convention Hall where clearances are reduced to 10 feet, other clearances exceed 12 feet.

1. The numerous points of ingress and egress to and from the Back Bay Center are accomplished off of the ring road.

2. The ring road has a basic width of 33 feet. If the Convention Hall were not developed this width could be reduced 11 feet. This width varies throughout the extent; the ring road has extra width where the greatest traffic movements and conflicts will occur. It provides adequate road way capacity (or supply) for even peak hours.

Table X

APPROXIMATE TIME REQUIRED TO EXIT

No. of Vehicles Departing	Time to Exit Dispersal to Exits Proportionate to Exit Capacities	Dispersal to Exits in Conformance with Market Distribution
1000	10	14
2000	16	25
3000	22	36
4000	29	48
5000	38	61

3. Steady flow will be achieved along the ring road. There are no direct crossings or conflicts; no traffic signals; no stoppages. It provides adequate and safe weaving, merging, and adjustment distances.

4. The ring road provides direct contact with all principal levels of the development. Road users have at least two opportunities to enter or leave each parking level.

5. The ring road is completely insulated from traffic on the circumferential streets. Motorists are concerned only with Center traffic. Reasonable speeds can be safely attained.

6. All traffic movements along the ring road are simple and conventional. Motorists are not required to make a multiplicity of decisions in traversing the road.

7. There are no parking interferences on the ring road because parking is not provided on the roadway itself.

Garage and Parking Areas

About 6000 parking spaces will be constructed. Divided into five principal areas on the site and additional areas at the Convention Hall; the parking spaces will be readily accessible from all points of entry. These areas will have ten entrances from the ring road. They will serve all buildings. Generators of heavy parking demands, such as the shopping center and the super market are provided parking in proportion to their demands.

Parking is principally distributed on the three lower levels of the developments:

Track Level	48%
Intermediate Level	35%
Boylston St. Level	17%

If it is desired, it is possible to develop additional parking under the landscaped area to the west of the site. Detailed parking arrangements are shown in Figures 15, 16 and 17.

Adequate parking dimensions have been employed for easy customer parking. To conform with architects' building plans a 30' x 30' column spacing has been indicated on parking layouts. When the garages are built significant capacity increases without sacrificing operations can be achieved by the use of 30' x 27' spacings of columns.

Basic unit parking dimensions are:

Ramps - 6% gradient; 12 feet one way
Aisles - 24 feet
Unit Depths - 60 feet
Stall Widths - 8½-9 feet

There is two-way circulation in the aisles. All parking is at right angles (90°). A system of internal ramps will allow maximum flexibility within the garages and between the parking levels. Parking is generally removed from the main circulation aisles.

All parking stalls, and most ramps have the same orientations. A pattern of uniformity is developed. It will be easy for customers to locate and "find" themselves within the parking areas. Drivers can park and lock their cars and then travel by escalators, stairways, and planned walkways to all parts of the Center. Upon leaving, motorists can quickly drive to parcel delivery points and can conveniently pick up passengers before leaving the internal roadway system of the Center.

Automatic integrating devices will be used to indicate garage areas in which spaces are available. Consideration is given to the use of treadle operated electric signboards at entrances and exits to garage sections. Motorists will thus be directed to parking spaces with a minimum of delay and cruising.

The track level parking arrangement is shown in Figure 15 (the elevation of this level is approximately 6 feet). Note the easy ramp "out in the open" up to the ring-road from the Exeter Street Underpass. Bringing this traffic into the lower level of the Center will encourage the equalization of overall parking loads Also of interest is the placement of peripheral ramps to minimize effects on local parking circulation, and reduce conflicts.

The intermediate level, Figure 16, (elevation approximate 15') has many frequent and easy contacts with the ring-road. It has a direct entrance from Exeter Street. Also provided is a direct exit to Belvidere Street which has been designed to "collect vehicles from the other two parking levels. One-way garage entrance and exit aisles conform with the direction of flow along the ring-road.

The Boylston Street level, Figure 17, (approximate elevation 24') has unusual ease of entrance from the ring-road. Note the "isolated" open air parking for the supermart, and the exit ramp into the ring-road near Newton Street.

Additional information and details on parking are given in Appendix II. This information is concerned with administrative decisions, operating practices, and legal requirements.

Other Features

A most unusual feature of the Center is the service facilities for commercial vehicles. Goods will be carried by trucks to the high levels of buildings and will be distributed by elevators downward. A truck road enters off Huntington Avenue on ramps behind Mechanics Hall; it goes to the Super Market, thence onto other principal buildings of the Center at elevation 52. This plan of overhead service has unique advantages. The truck road will be separated from the ring road and other circulation routes in the Back Bay Center. Truck-vehicular conflicts will be non-existent. Truck servicing will be carefully screened from view, thus enhancing the overall attractiveness of the Center.

Special taxi and pickup facilities are also provided. At the railroad station, office buildings, Convention Hall, and hotel, special care was given to the development of direct and convenient taxi loading and storage facilities. Taxis will not have to circulate and intermingle with other Center traffic when leaving the railroad terminal.

In addition to direct service from the ring-road (and taxi road) additional roadway facilities serve the Convention Hall. These roads will provide servicing and pick-up at the Hall, distinct from the general Center circulation plan.

Sidewalks, bridges, and escalators are located to serve principal pedestrian movements. Pedestrians can conveniently and safely enter from subway stations and key street contact points. Pedestrian conflicts with the ring road are minimized.

A new subway station is planned at Boylston and Fairfield Streets. This station is to have a direct all weather pedestrian contact with the Center. Pedestrians may leave the subway and enter the Center directly without crossing Boylston Street or the ring road. Easy access will be provided from the existing Mechanics Station on Huntington Avenue over an attractive pedestrian way.

Carefully placed signs, especially designed for the Center, will give directions and information to all persons entering. Judicious use of color schemes on these signs will increase their clarity, comprehensibility, and utility.

Retrospect

In summary, a complete roadway, traffic and parking plan has been devised. The Back Bay Center will be accessible to all types of customers by all forms of transportation. Traffic movements and parking will be safe and attractive. Traffic advantages, combined with other unusual features of the Center will make it a most unique and successful development.

APPENDICES

Appendix I

TRAFFIC OPERATIONAL DETAILS

In Chapter III, traffic conditions currently existing on principal roadways serving the site were discussed. During the field studies many details were recorded concerning points of traffic congestion. These are given in this appendix.

It is not the purpose in presenting this information to imply that serious conditions of access prevail. Rather, it is apparent that many of the problems can be improved or remedied by simple and inexpensive treatments. While these are discussed in the report, it is apparent to one familiar with traffic matters from the following descriptions that most corrections are not difficult. Many of them will require only basic regulatory treatment

It should also be noted that the problems of peak hour congestion are similar to problems which prevail in all metropolitan areas:-

Two-lane operations in each direction on Boylston Street provide sufficient capacities throughout its extent, even in peak hours. The greatest reduction in the facility of flow occurs at this junction with Massachusetts Avenue. Brookline Avenue which connects with Boylston Street operates fluently in both rush and off-peak periods.

Peak and other flows are now adequately accommodated on Exeter Street. This street operates one-way northbound.

Roadway capacities on Huntington Avenue exceed the present volumes between Copley Square and Gainsborough Street. West of this intersection, surface-subway cars operate in the central

reservation of the roadway and the effective width for vehicular traffic is reduced. During rush hours this is alleviated by effective parking prohibitions. Route flows in Huntington Avenue increase as the route proceeds west from the Center. Because of these additive movements, and restrictive intersections, saturated conditions develop during rush hours at such locations as Ruggles Street, Brigham Circle, and South Huntington Avenue. At peak hour the intersections are saturated and backups result--at other times there are no serious delays even though speeds through some of the intersections are reduced.

Intersections at Newton Street with Columbus and Huntington Avenues now approach saturation.

Stuart Street volumes are approaching saturation during rush periods. At Huntington Avenue during the evening rush hour, two approach traffic lanes form, and traffic moves efficiently even though near capacity conditions develop for part of the hour.

The Copley Square (Huntington-Dartmouth-St. James Street intersection is manually controlled by police. While during rush hours it approaches saturation, no accumulated backups, indicative of over capacity operations, were discerned.

Dartmouth Street north of Huntington Avenue permits two moving lanes in each direction. South of Huntington, the offset alignment and reduced width restricts movements to single lane operations. Occasional peak-hour backups develop on all approaches of the Dartmouth-Stuart intersection.

Massachusetts Avenue is 60 feet wide through much of its extent. In the environs of the site, because of double parking

generated by many business frontages, two lane operations in each direction are not always achieved. Vehicular headways are increased by the large number of commercial vehicles using the street. Both northbound and southbound flows are saturated during rush hours.

The intersection of Massachusetts Avenue and Boylston Street is the capacity and speed bottleneck along the route and it is extensively treated in this report. Intense business activity, frequent turns by transit vehicles, and constant left turn conflicts all hinder intersection performance. The pedestrian interval, while on call, is used every cycle, further reducing the effective green period for north-south traffic. Congestion is even apparent at this location during off-peak hours when vehicular volumes are not as great. Because of rush hour traffic demands on Columbus Avenue, key approaches are saturated at the Columbus-Massachusetts intersection during peak periods. At Westland Avenue, the present signal timing allotted to southbound Massachusetts Avenue traffic is inadequate.

Curb parking on Massachusetts Avenue is restricted during peak hours (1) along the west curb from 4-6 p.m.; (2) along the east curb from 8-10 a.m. (south of Belvidere Street); and (3) from 8-10 a.m. and 4-6 p.m. between Belvidere and Beacon Streets. With these restrictions three lane operations do not develop. However, they do permit two through lanes around waiting left turning vehicles at key intersections.

Commonwealth Avenue has a high traffic capacity and operates at high efficiency. The present eastbound signal timing at Clarendon Street is restrictive during both rush and pre-rush periods.

At the Charlesgate Drive existing weaving of north-south traffic on Commonwealth tends to blockade the intersection as volumes develop. Traffic moves fluently through Kenmore Square although the intersection approaches saturation. Curb parking is permitted on the north curb. Another parking restriction exists along the south curb during the morning rush hour.

The Boston University Bridge - Commonwealth intersection is one of the heaviest traffic points in the Boston area. At present it is under police control and operates in a multiplicity of phases to accommodate left turns off and onto the bridge. Key approaches of the intersection are saturated; during peak hours backups of traffic across the bridge are frequent and sustained.

Columbus Avenue like Huntington Avenue is a radial multilane route which develops high directional peak hour flows. Saturation develops along Columbus Avenue during rush hours in the prevailing direction of flow at its intersections with Massachusetts Avenue, Roxbury Crossing, Jackson Square and Egleston Square.

The limited access, conflict free character of Storrow Drive permits it to carry heavy traffic volumes at high overall speeds. It has diverted considerable volumes from Beacon Street alleviating capacity problems from the latter in the environs of the site. At Massachusetts Avenue, direct connections between the Drive and Harvard Bridge are provided.

Beacon Street between Berkeley Street and Kenmore Square provides three moving westbound lanes, in addition to two parked lanes. Signals are progressively timed; peak and off-peak traffic flows fluently. At Massachusetts Avenue, an additional right turn

lane is provided; peak hour flows are efficiently accommodated.

Traffic operations in the Park Square area east of the Back Bay Center tend to be impeded by relatively ineffective use of existing streets rather than the lack of available physical roadways. This condition exists even though the officials have done an excellent job in the development of one-way streets, traffic signal systems, and judicious parking prohibitions.

Appendix II

ADDITIONAL PARKING DATA

The Back Bay Center Parking Area can be leased to private enterprise for operation under requirements of the City's off-street parking act. In terms of competition, demands and functional treatment, it is an attractive parking property.

Demands

The parking garage is strategically related to existing off-street facilities in its immediate vicinity and in downtown Boston. The Center is the westward extension of many business frontages, likewise the garage is the westward extension of the off-street facilities which now serve central Boston. The Center and the garage will intercept persons otherwise destined for downtown. The garage integrates well into the downtown parking pattern; yet, existing and contemplated large off-street facilities are too far removed in terms of walking distances to be competitive.

Within a 600 foot radius of the Center, there are about 1500 curb and off-street parking spaces. Many of the curb spaces are metered. These parking spaces are distributed approximately as follows:

Along Curbs	65%
In Lots	25%
In Garages	10%
Total	100%

Observations of existing parking practices reveal a high degree of curb usage during midday periods. Usage on most principal streets was found to exceed 75% of the curb spaces available.

When the Center is developed, it is reasonable to expect that there will be about 40 per cent loss in the existing spaces available; within a 300 foot radius over half of the existing spaces would be lost. Currently, there are several parking lots on the Center site; these have a capacity of about 300 spaces. Some curb parking spaces would have to be eliminated to effect the proposed traffic plan. The net parking spaces available, within the 600 foot radius of the developed Center would be distributed approximately as follows:

Along Curbs	46%
In Lots	4%
In Garages	10%
Total	60%

It is apparent that the parking potentials of the Center Garage are excellent. In addition to the demands generated by the removal of existing parking facilities at and adjacent to the site, the generating capacities of the Center will develop sufficient demands to make parking operations financially feasible. Average daily parking demands, even in excess of the spaces available can be demonstrated. Approximate parking requirements on an average shopping day exceed 6000 parking spaces. This demand is distributed as follows:

Retail Area	60%
Hotel and Motel . . .	5%
Office Buildings . .	18%
Railroad Station . .	1%
Center Total	84%
Convention Hall . . .	16%
Grand Total . . .	100%

Even greater parking demands will be developed during peak holiday shopping periods. Increased usage of the automobile as a means to travel - as is the tendency - will increase demands potential to the Back Bay Center in future years. There is an exceptional diversification of the parking demands:

Short-time parkers will include persons destined for the food market, restaurants, the railroad station, the bank; shoppers, and business visitors.

Long-time parkers include persons destined for hotels and employees of the office buildings and other establishments.

Evening parking demands will be generated by the Convention Hall, hotels, shopping area, restaurants and nearby entertainment areas.

Overnight parking demands will be developed by persons at the hotels, and by residents near the Center.

Some Contract as monthly parking can be expected from employees, hotel guests, nearby residents and others.

The magnitude and diversification of parking demands will give the operators wide latitude in developing operating practices.

Rates

There is, of course, a variance in the rate structure of the off-street parking areas in Central Boston. For city designated garages, as the Back Bay Center Parking Area would be, there is a rate structure effected by legislation, which must be applied.

This rate structure is slightly lower than rates in effect in the core area of Boston. It is as follows:

8:00 A.M. - 6:00 P.M. daily (including Sundays and Holidays)

35¢ - first 2 hours or fraction thereof

25¢ - third hour or fraction thereof

10¢ - for each succeeding hour or fraction thereof

$1.00 - maximum charge for a continuously parked vehicle

6:00 P.M. - 12:00 P.M. - 35¢

12:00 P.M. - 8:00 A.M. - 35¢

It is suggested that monthly contract parking be developed. Based on prevailing rates in the area, a charge of about $25.00 per month could be collected.

Design and Operation

The Back Bay Center Parking Area has been carefully designed for customer parking. It has employed liberal dimensions.

Columns are removed from parking circulation aisles. All parking areas have been uniformly oriented; circulation plans are simple and obvious. Cashier and attendant locations are strategically placed. Possibilities exist for the sectionalization or compartmentalization of the garage, if conditions warrant. Each parking section would be particularly designated. Consideration is being given to the use of various color schemes to delineate the various parking areas.

It should be noted that throughout the United States, the latest trends are toward using a system where each customer parks his vehicle in preference to an attendant parking system. The basic reasons for this are:

1. Customers park their own cars and are able to lock them personally.

2. A minimum of reservoir space is required.

3. Parking capacity is increased since the area of reservoir space is reduced.

4. The operating expenses are reduced since fewer attendants are required.

5. This type of facility is suited for both short-term and long-term parkers.

6. Higher parking turnovers are encouraged.

The parking areas have been designed so that they can be adapted to an automatic integrating device or some other simple centralized control.

Pedestrian circulation has been given careful consideration. Stairs, exits and ramps provide convenient access from the parking areas into the Center proper. Rest rooms and waiting facilities are provided.

Adequate levels of illumination will be maintained.

Control contact points between the ring road and the various parking areas permit standard garage operation procedures:

1. Customers would receive a ticket upon entering.

2. When leaving the Center, they would pay, have their ticket validated, and then pick up their car.

3. The receipted ticket would be surrendered upon exit from the parking areas onto the ring road.

This method of operation will eliminate delays during hours of peak traffic movements.

Complete flexibility will be afforded the garage operator in the control of entry and exit, and in use of various sections of the garage.

Automotive Servicing

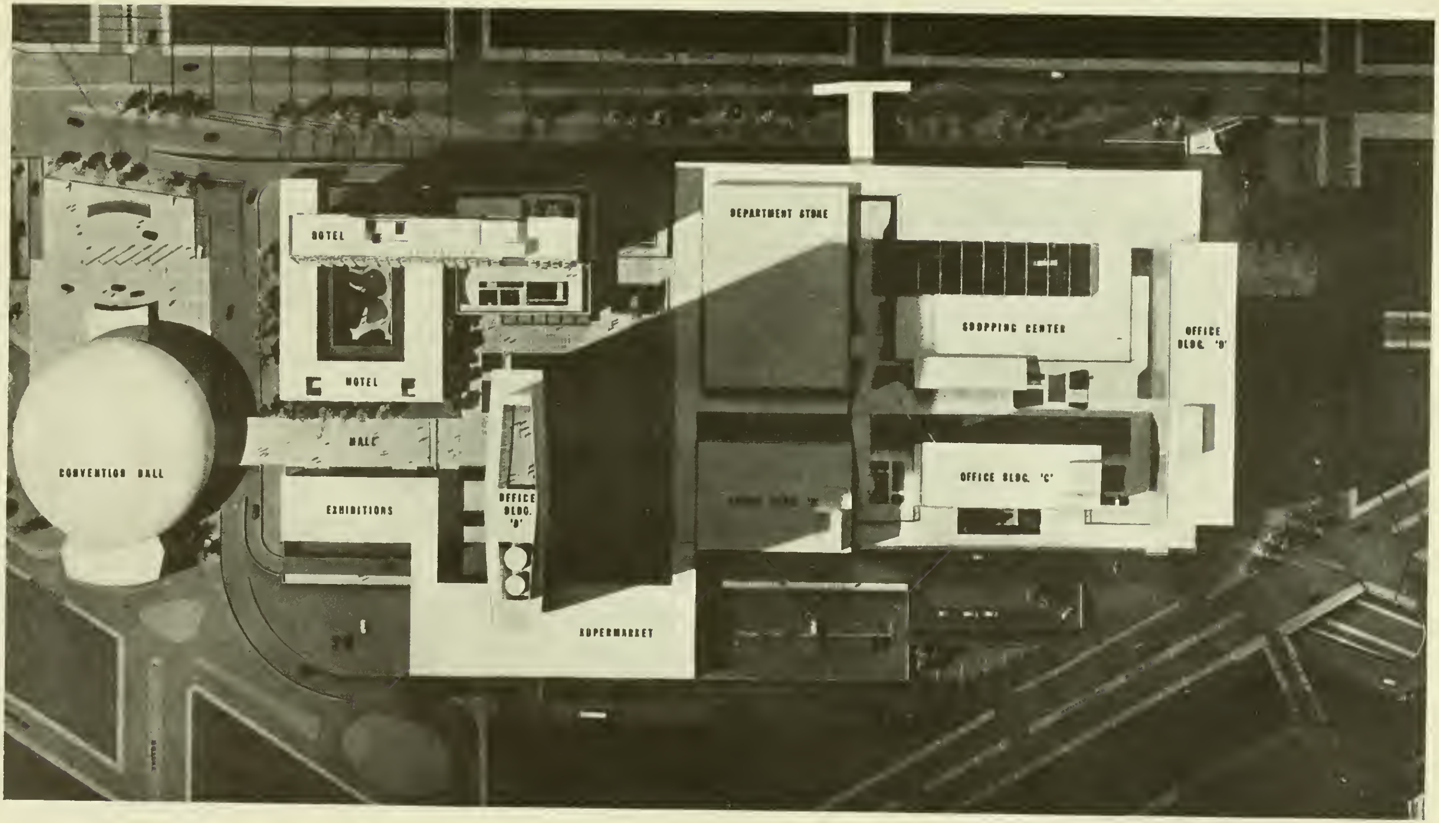
With the garage operated under the City's municipal parking acts, automotive servicing facilities cannot be developed within the garage area. It is required that the entire area be used exclusively for parking. However, plans provide for the retention of some garage space under private management so that adequate servicing can be developed by the garage operator for the entire garage area. In other words, the operator leasing the municipally controlled garage area can also lease from the Center management an adequate garage space for the sale of gasoline, automotive accessories and fuels.

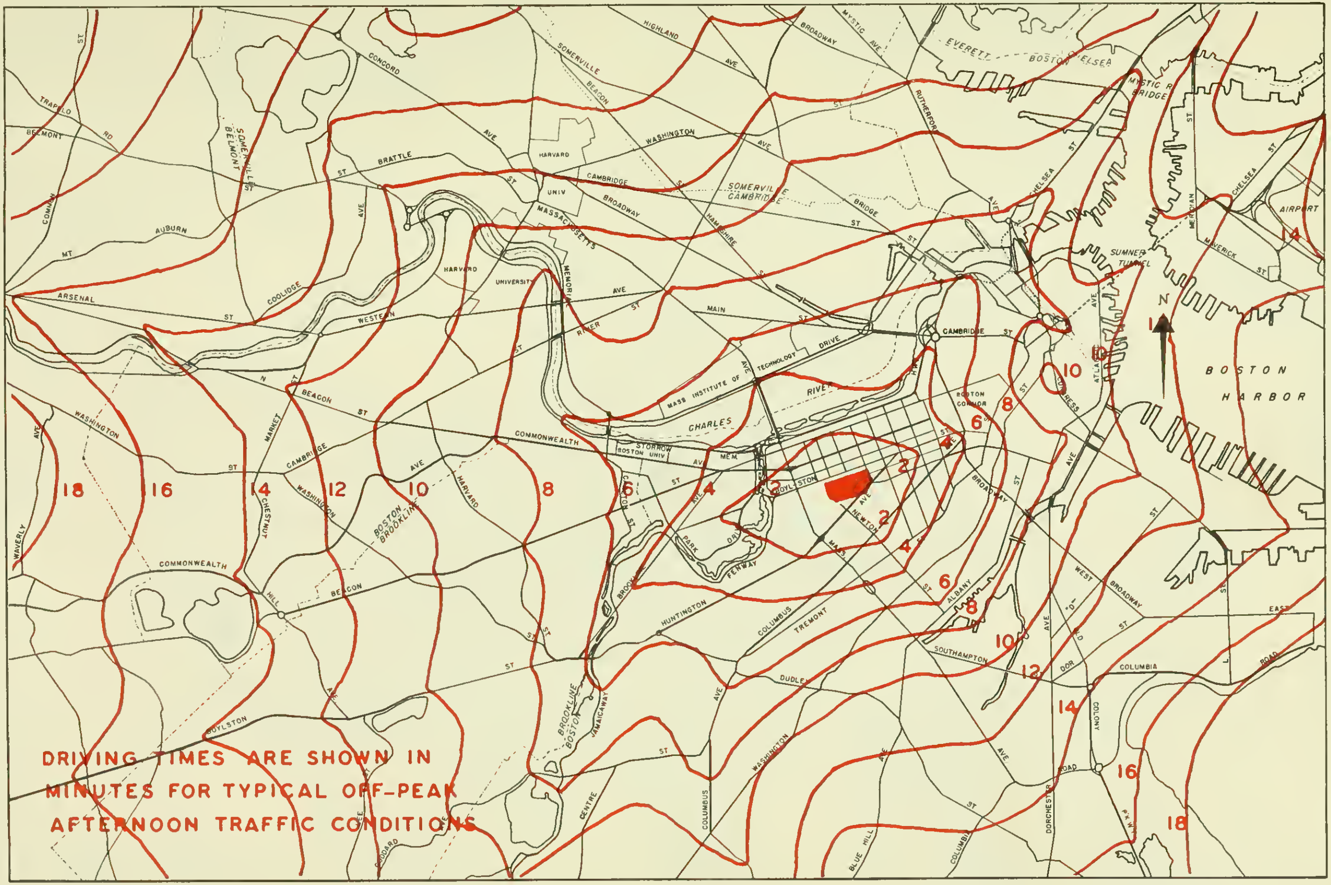
Access

As already described in the report, all parking areas are readily accessible from the ring-road. They are distributed throughout the Center with regard to parkers' destinations. There are at least two opportunities to enter and leave each principal parking level. A complete system of internal ramps permits convenient and flexible intraflow movements and provides easy access to lower parking levels. In addition there are several direct contacts to lower levels from Huntington and Exeter Streets.

Motorists will enter the Back Bay Center in the many judiciously placed street contact points. They will circulate along the ring-road and enter their desired parking area. They will quickly park, lock their cars, and proceed via escalators, planned walkways, and stairways to the Center proper.

Figure 1
'Back Bay Center'





DRIVING TIMES ARE SHOWN IN MINUTES FOR TYPICAL OFF-PEAK AFTERNOON TRAFFIC CONDITIONS

SCALE: 0 0.5 1.0 MILE

ROUTES - TRAVEL TIMES

FIGURE 2

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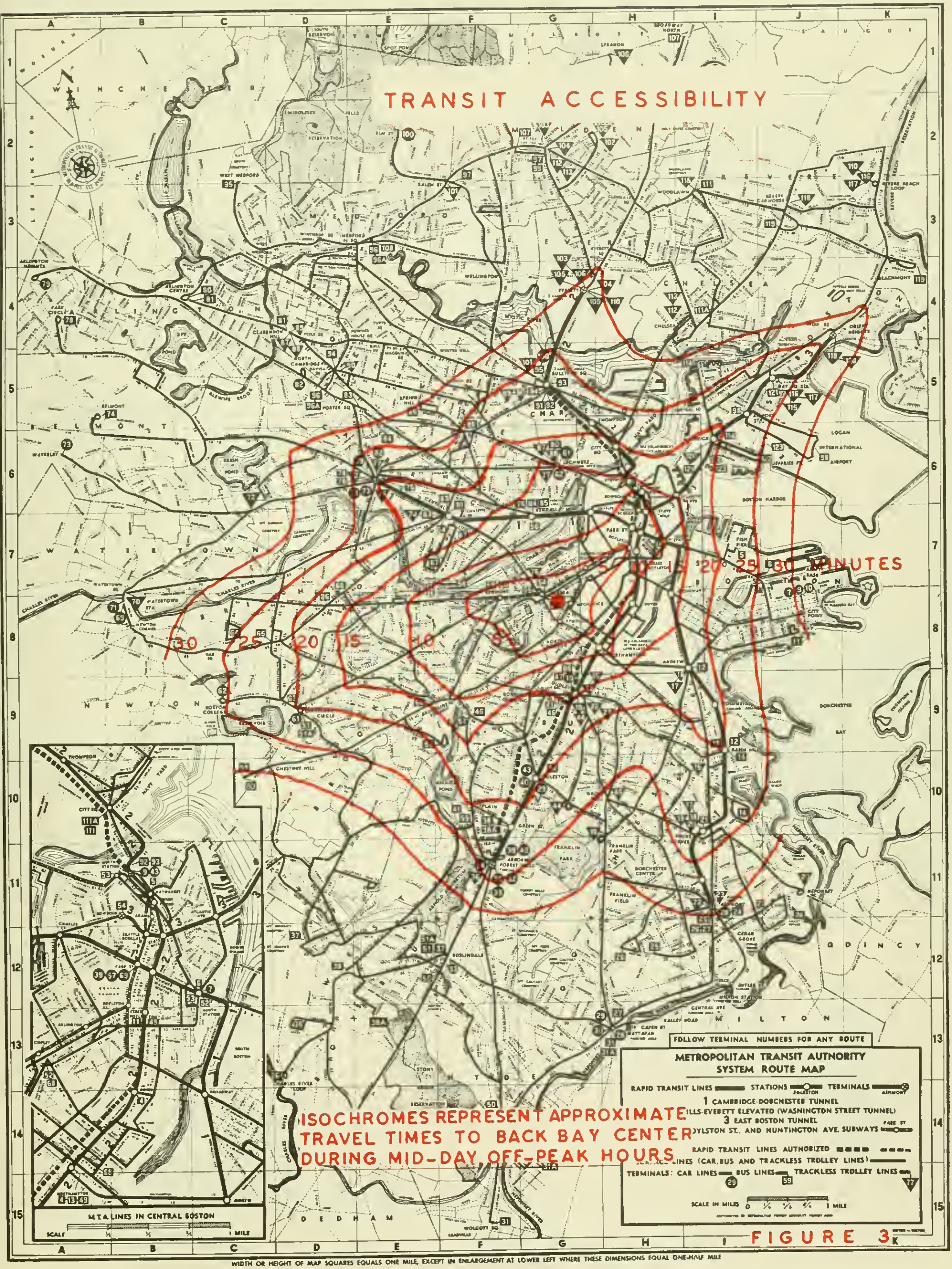
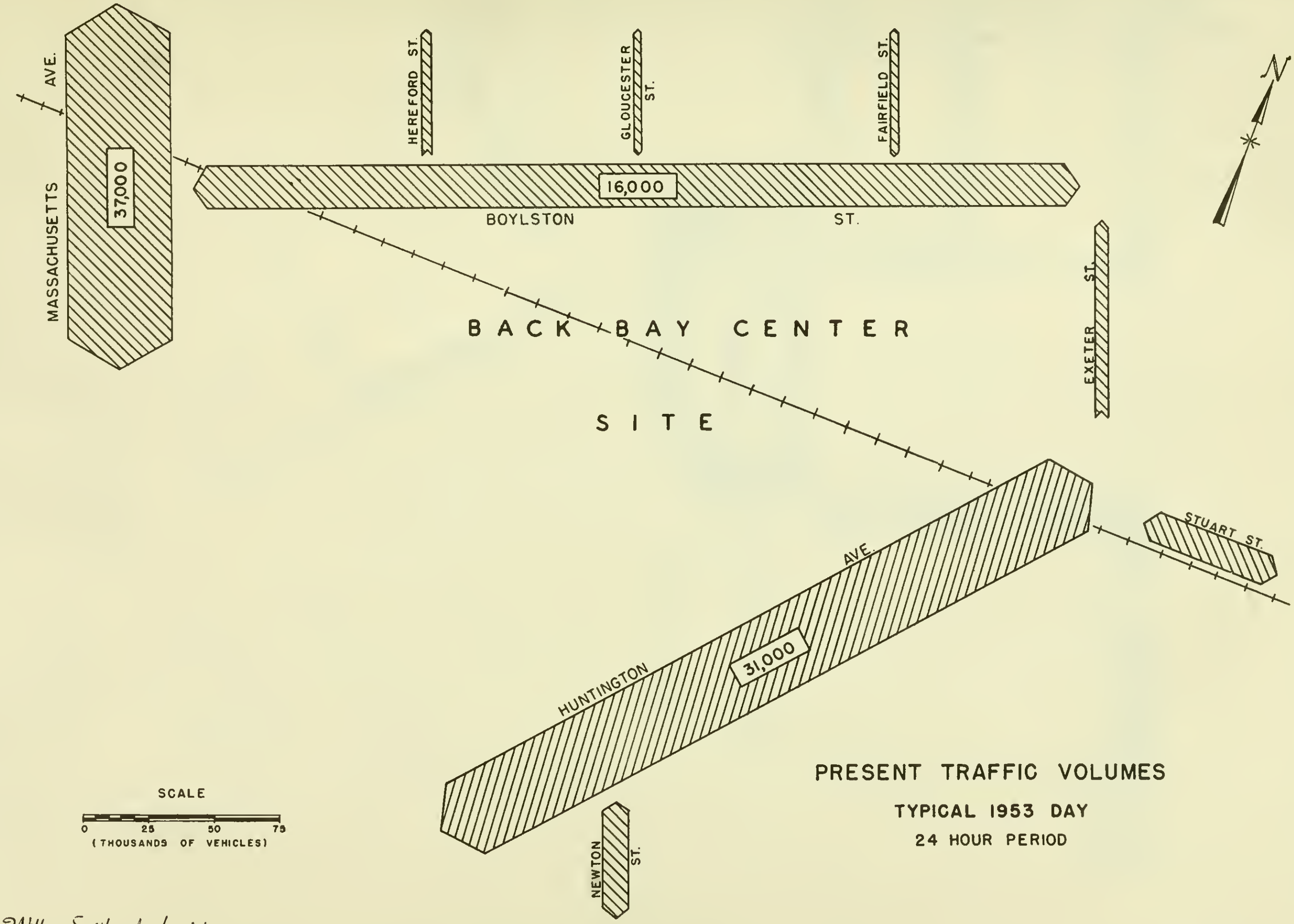


FIGURE 3

WIDTH OR HEIGHT OF MAP SQUARES EQUALS ONE MILE, EXCEPT IN ENLARGEMENT AT LOWER LEFT WHERE THESE DIMENSIONS EQUAL ONE-HALF MILE



PRESENT TRAFFIC VOLUMES

TYPICAL 1953 DAY

24 HOUR PERIOD

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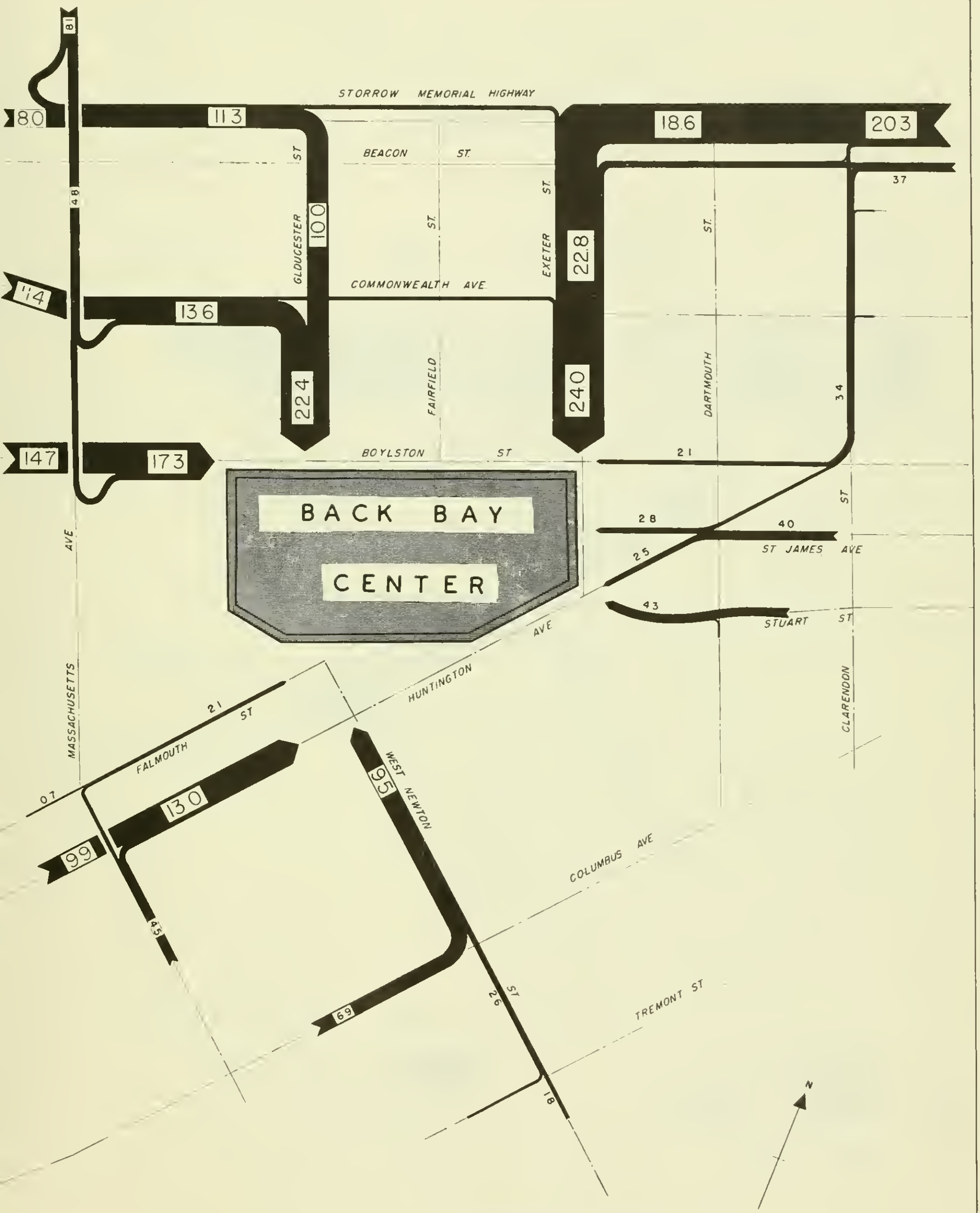
FIGURE 4



TRAFFIC DISTRIBUTION

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FIGURE 5

TRANSIT

DIRECTION OF APPROACH

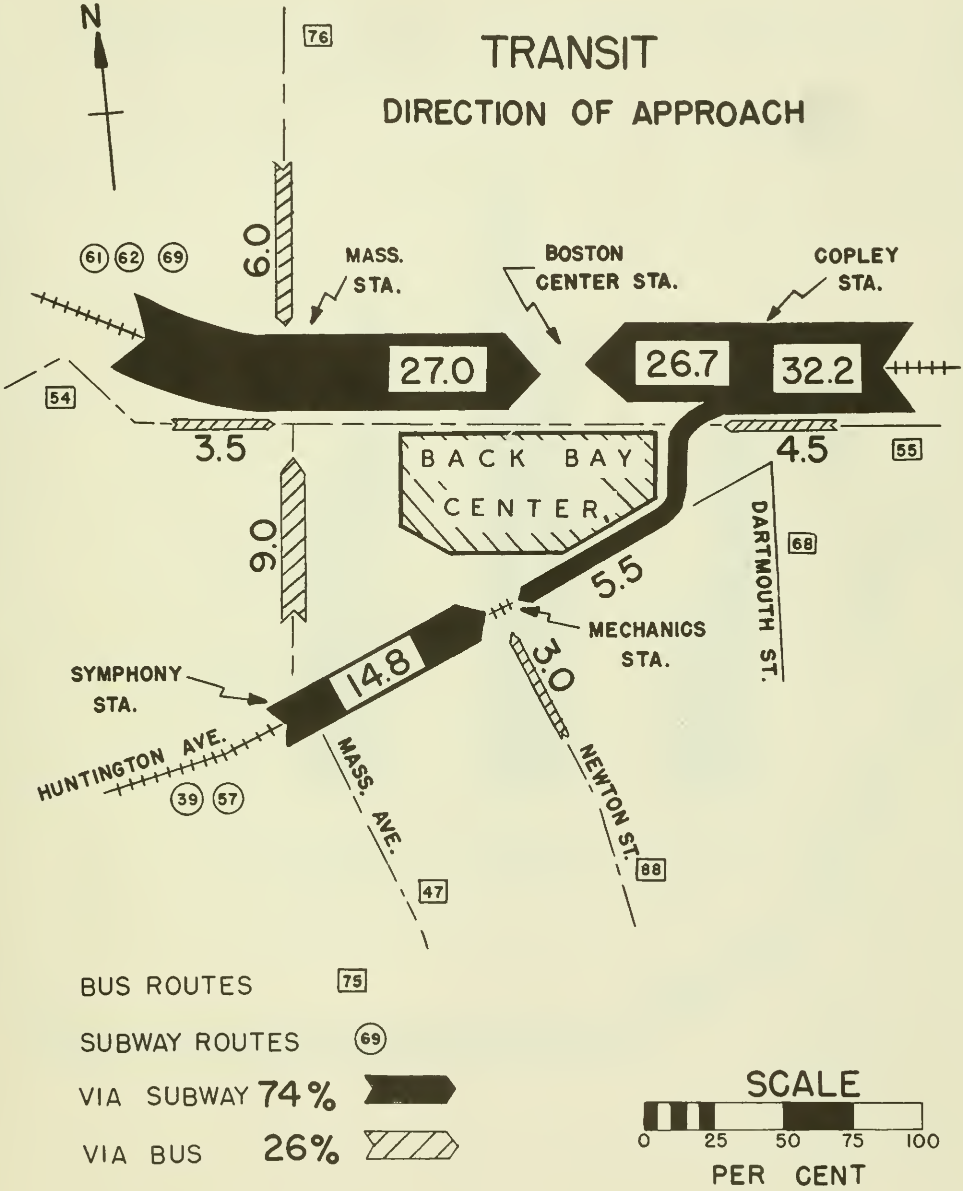

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FIGURE 6

HOURLY TRAFFIC MOVEMENTS

AVERAGE SHOPPING DAY

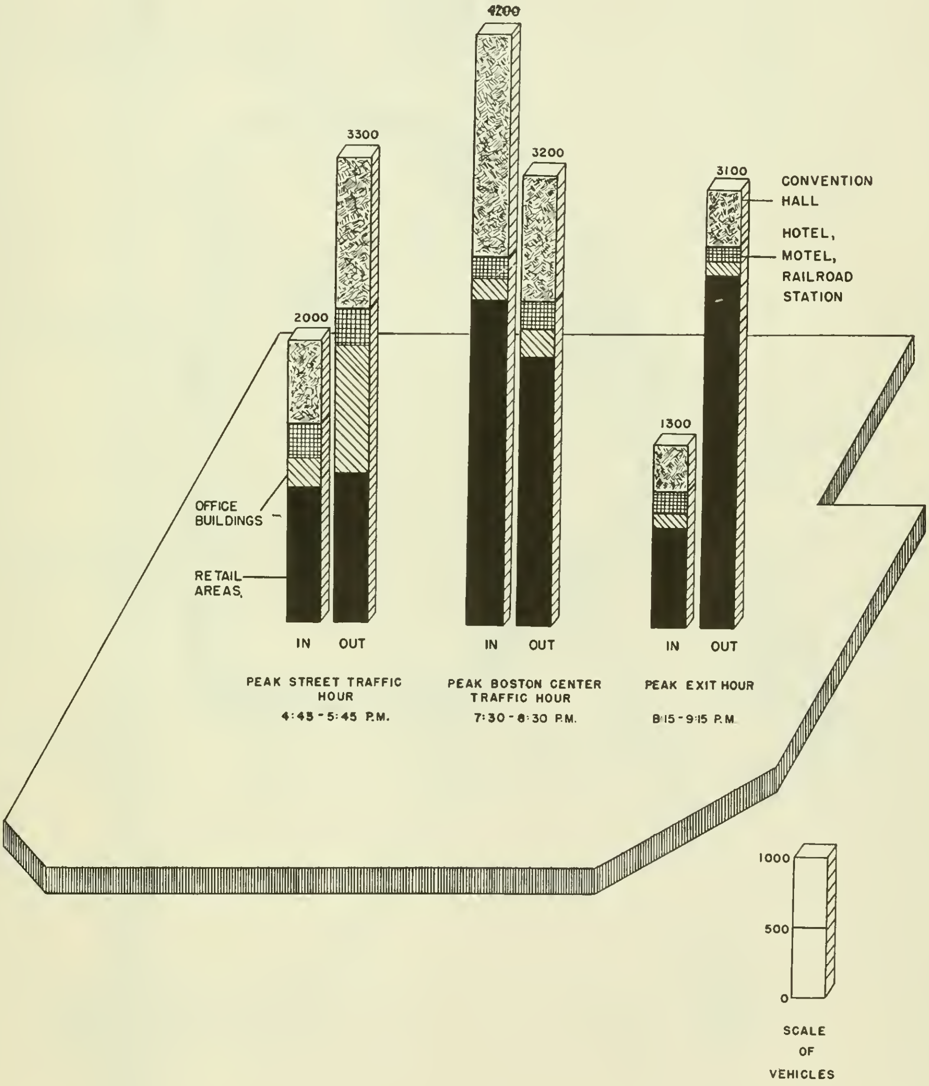

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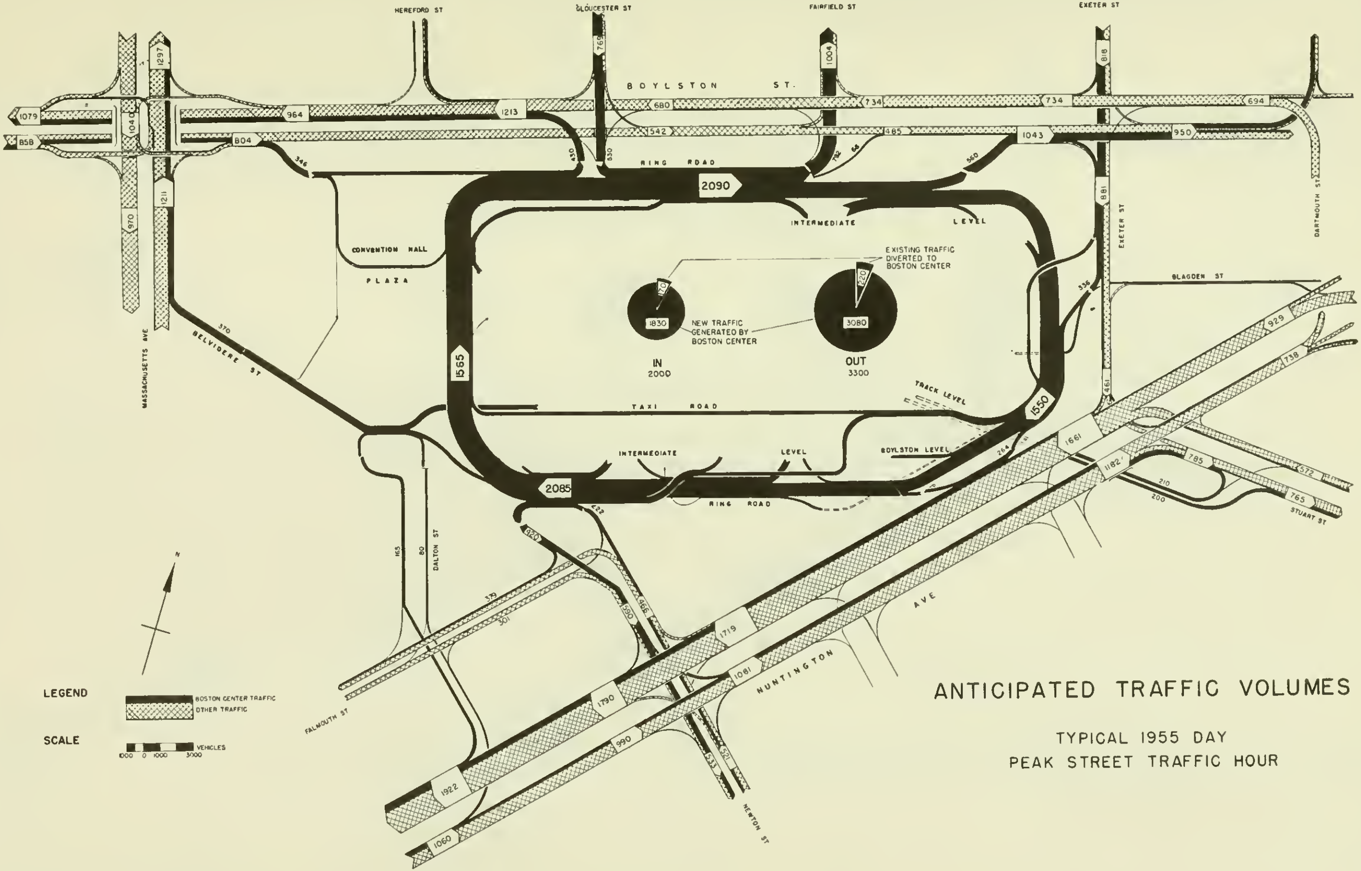
FIGURE 7



ANTICIPATED TRAFFIC VOLUMES

TYPICAL 1955 DAY
PEAK STREET TRAFFIC HOUR

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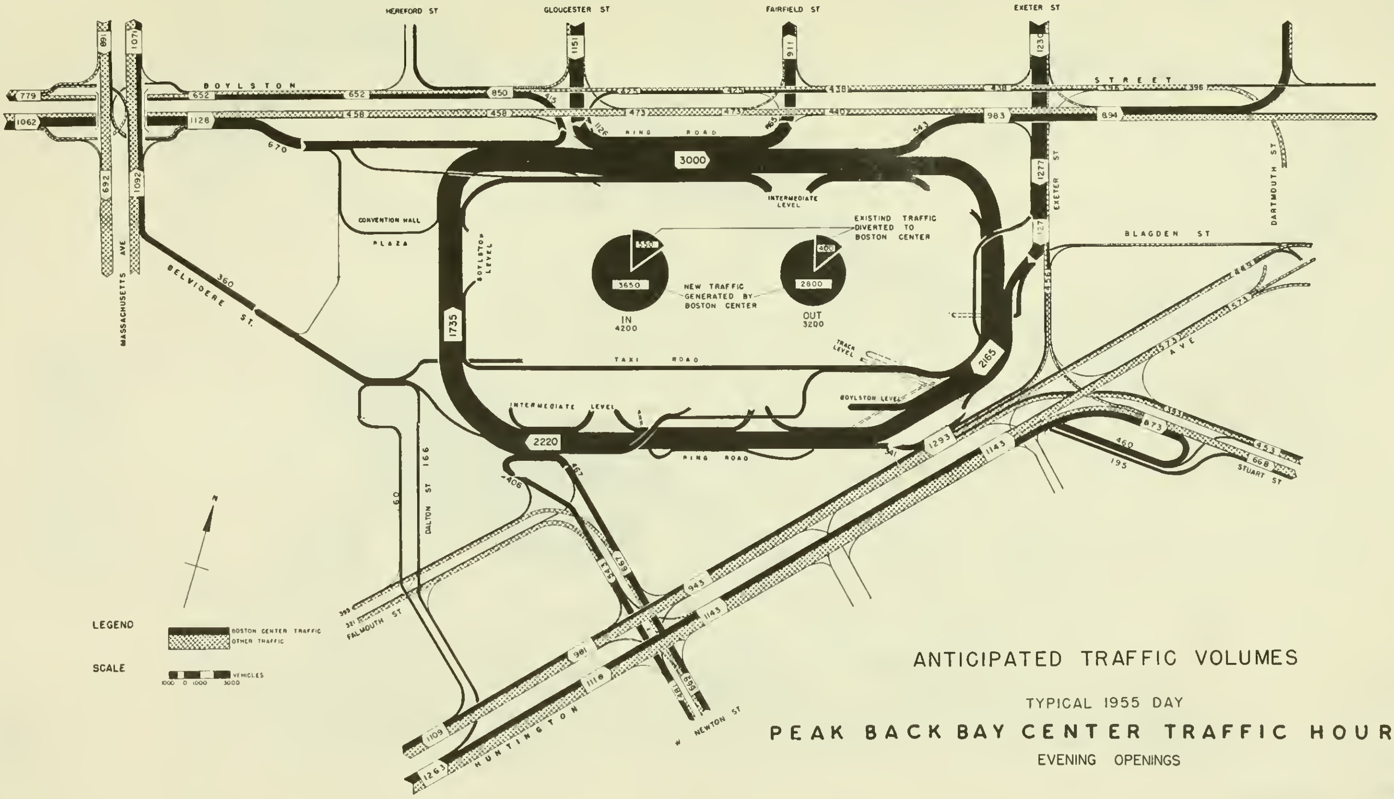
FIGURE 8



ANTICIPATED TRAFFIC VOLUMES

TYPICAL 1955 DAY

PEAK BACK BAY CENTER TRAFFIC HOUR

EVENING OPENINGS

FIGURE 9

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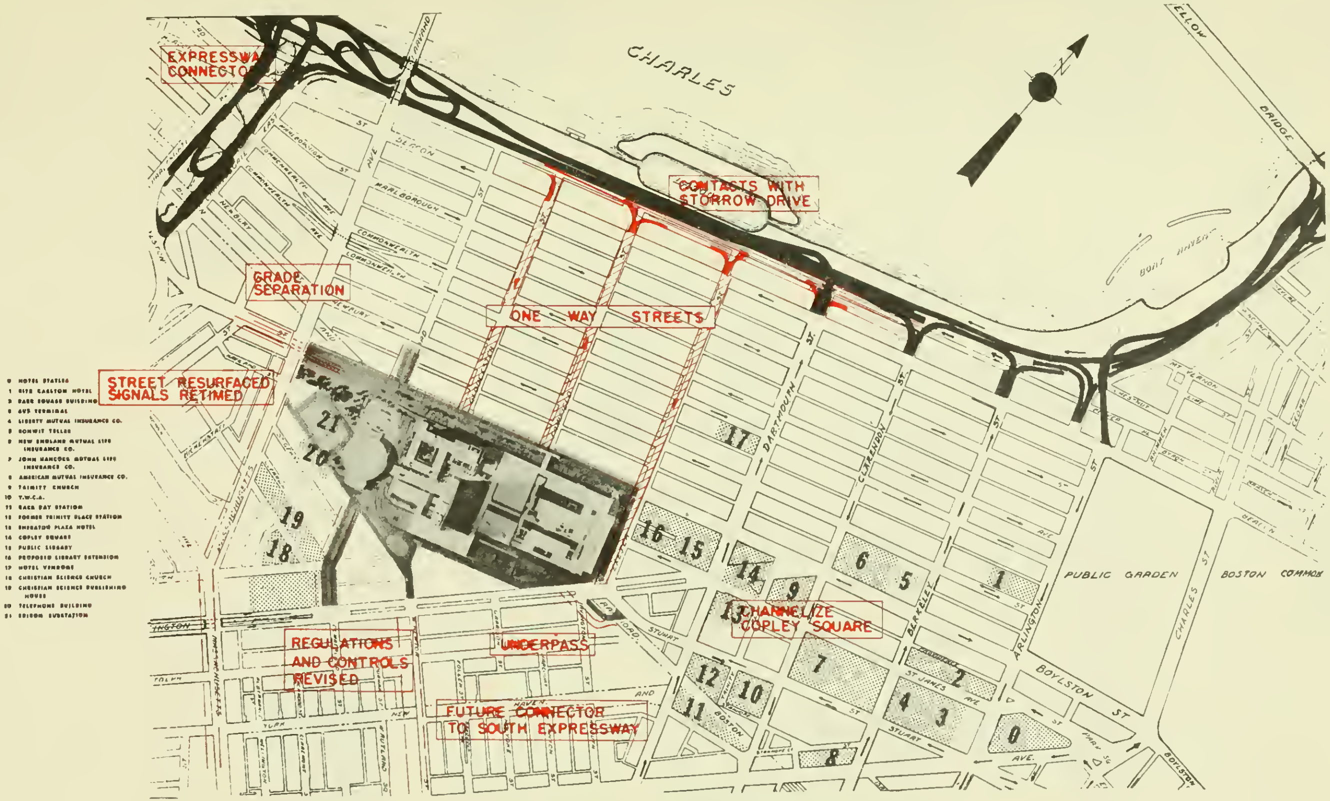

SUGGESTED ACCESS FEATURES INDICATED

ACCESS

SITE ENVIRONS

FIGURE 10

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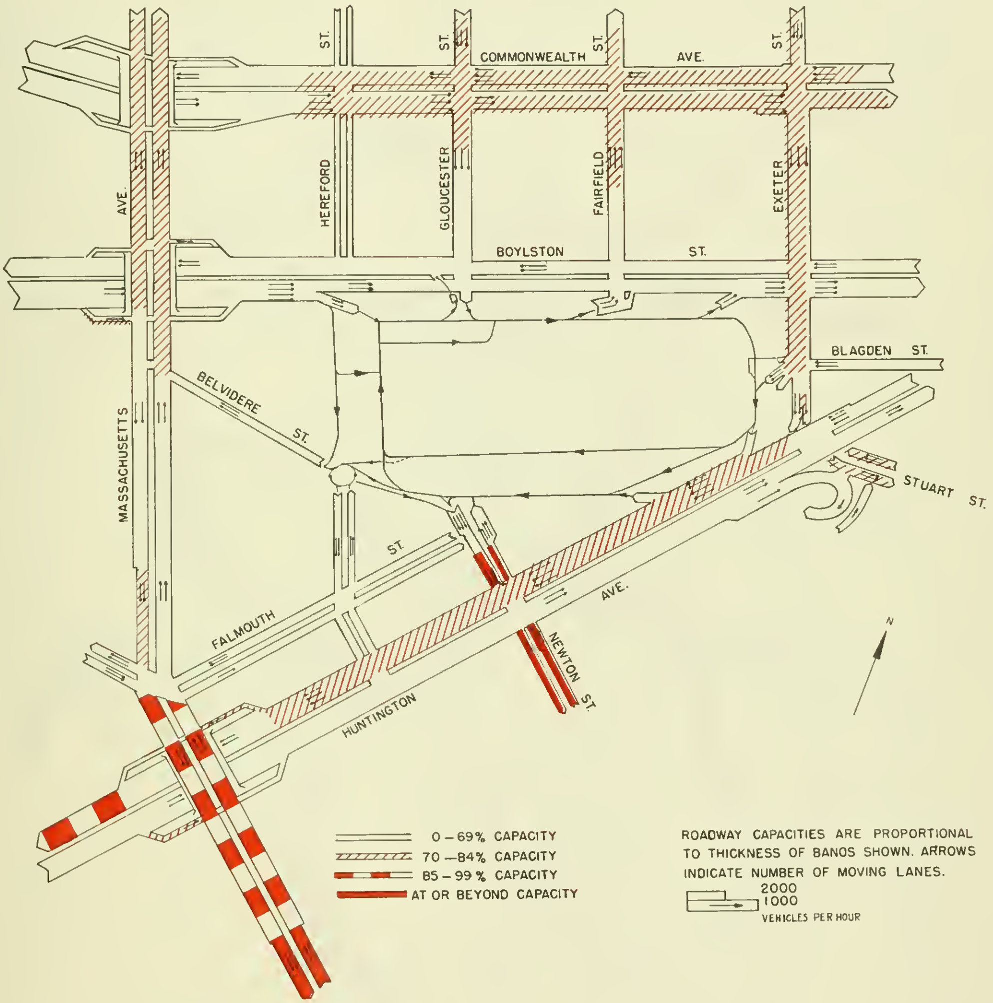
TRAFFIC SUFFICIENCY

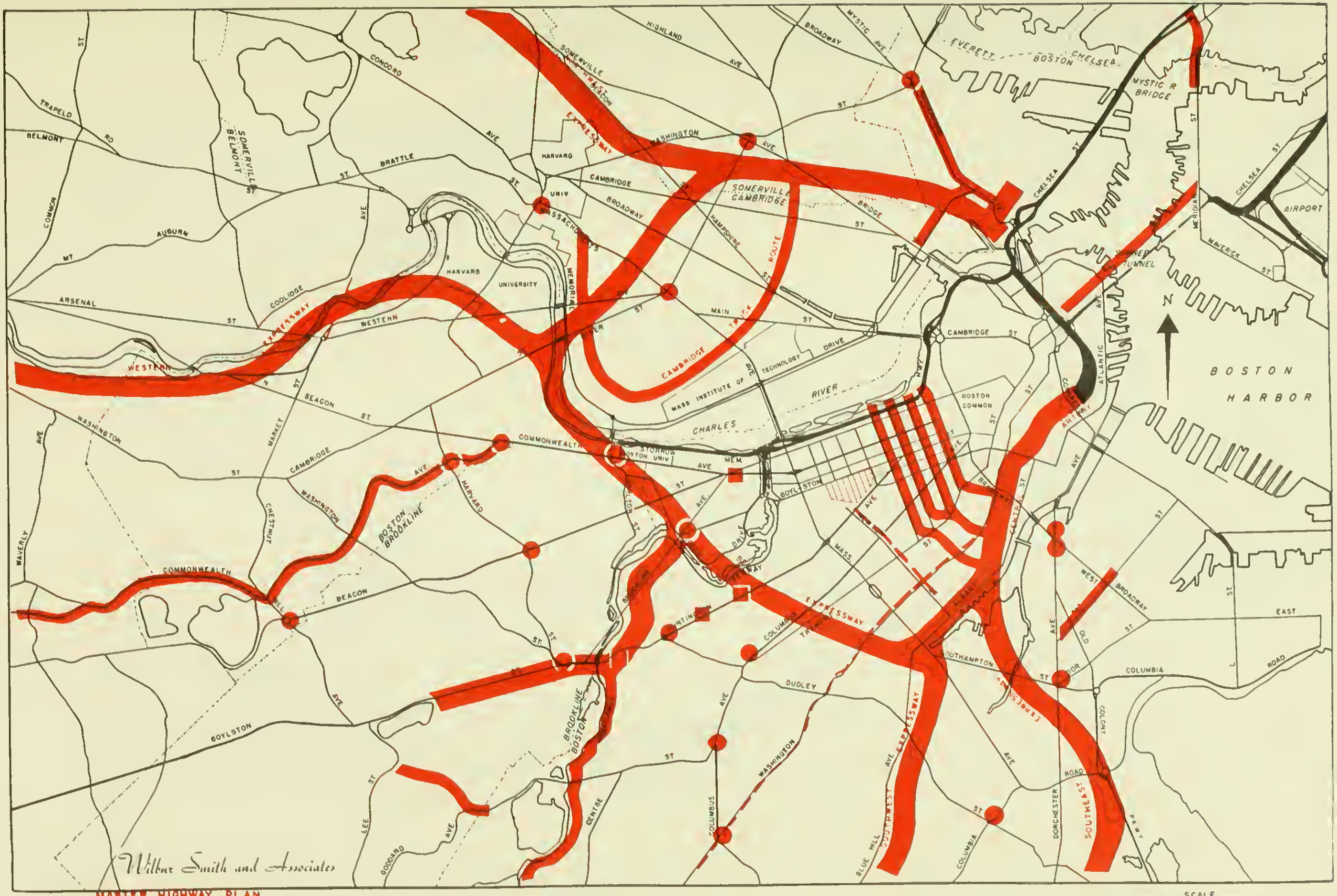
SITE ENVIRONS

PEAK STREET AND BACK BAY CENTER TRAFFIC HOURS



ROADWAY CAPACITIES ARE PROPORTIONAL TO THICKNESS OF BANDS SHOWN. ARROWS INDICATE NUMBER OF MOVING LANES.

FIGURE 11



MASTER HIGHWAY PLAN

- 🟥 EXPRESSWAYS
- ▬ ROUTE IMPROVEMENTS
- ● INTERSECTION TREATMENTS

ADDITIONAL IMPROVEMENTS

- — — STREET WIDENING
- ■ REVISED REGULATIONS

AREA HIGHWAY IMPROVEMENTS

NOTE BASED ON MASTER HIGHWAY PLAN, 1948, FOR THE BOSTON METROPOLITAN AREA AS MODIFIED BY GENERAL PLAN FOR BOSTON, PRELIMINARY REPORT, 1950

FIGURE 12

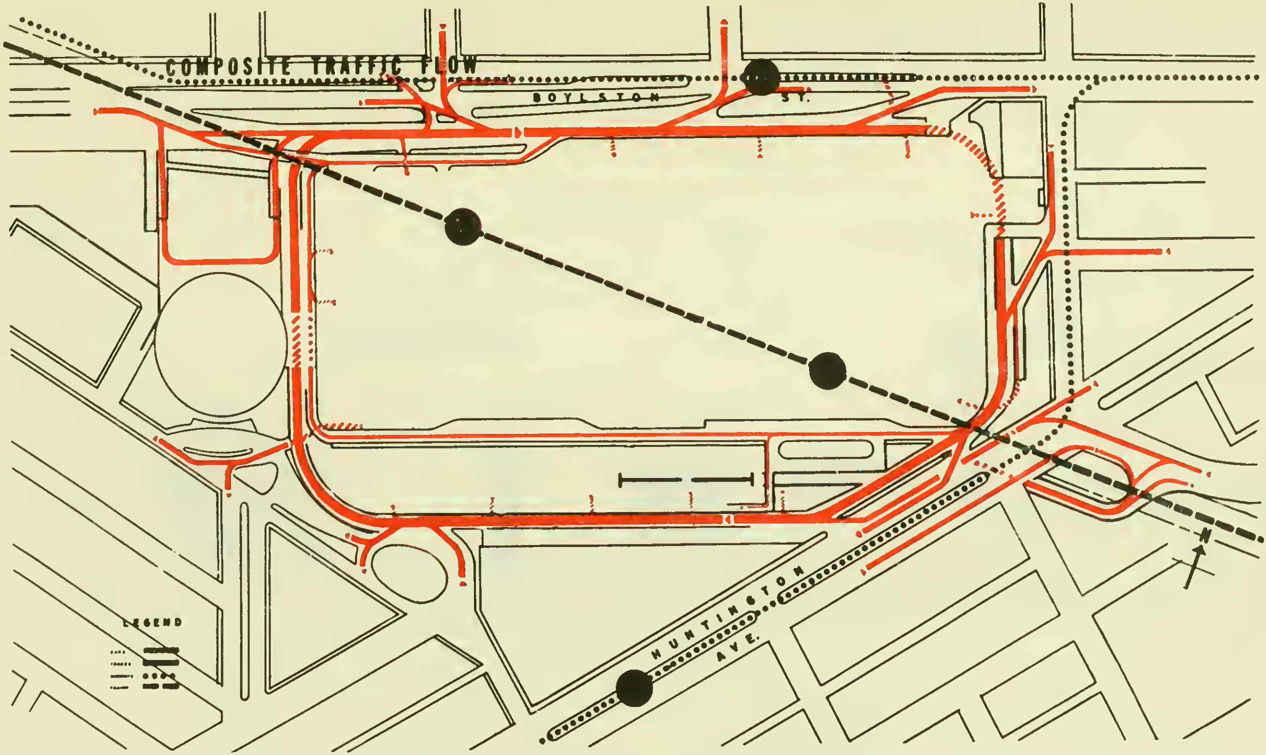


FIGURE 13

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ROADWAY PLAN

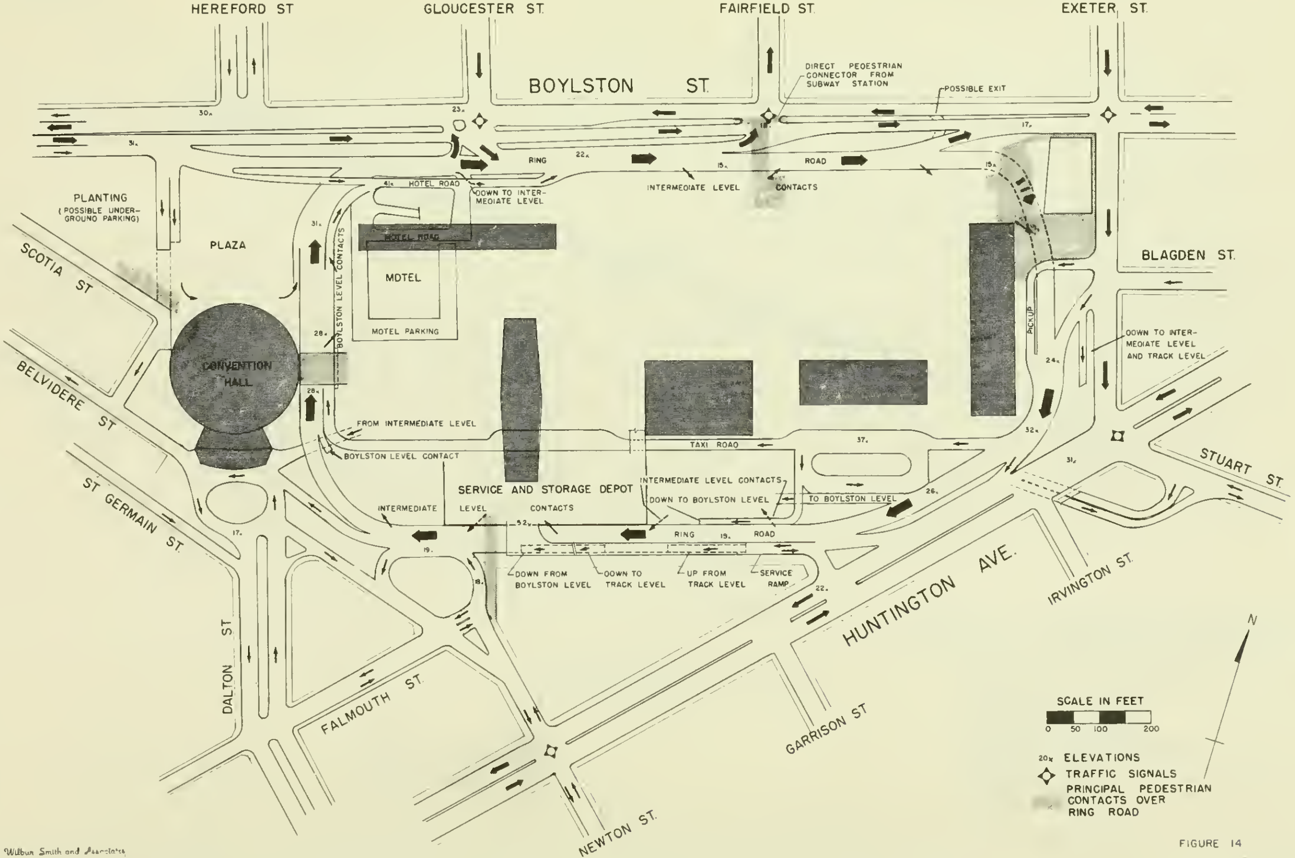

FIGURE 14

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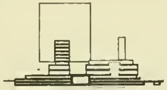
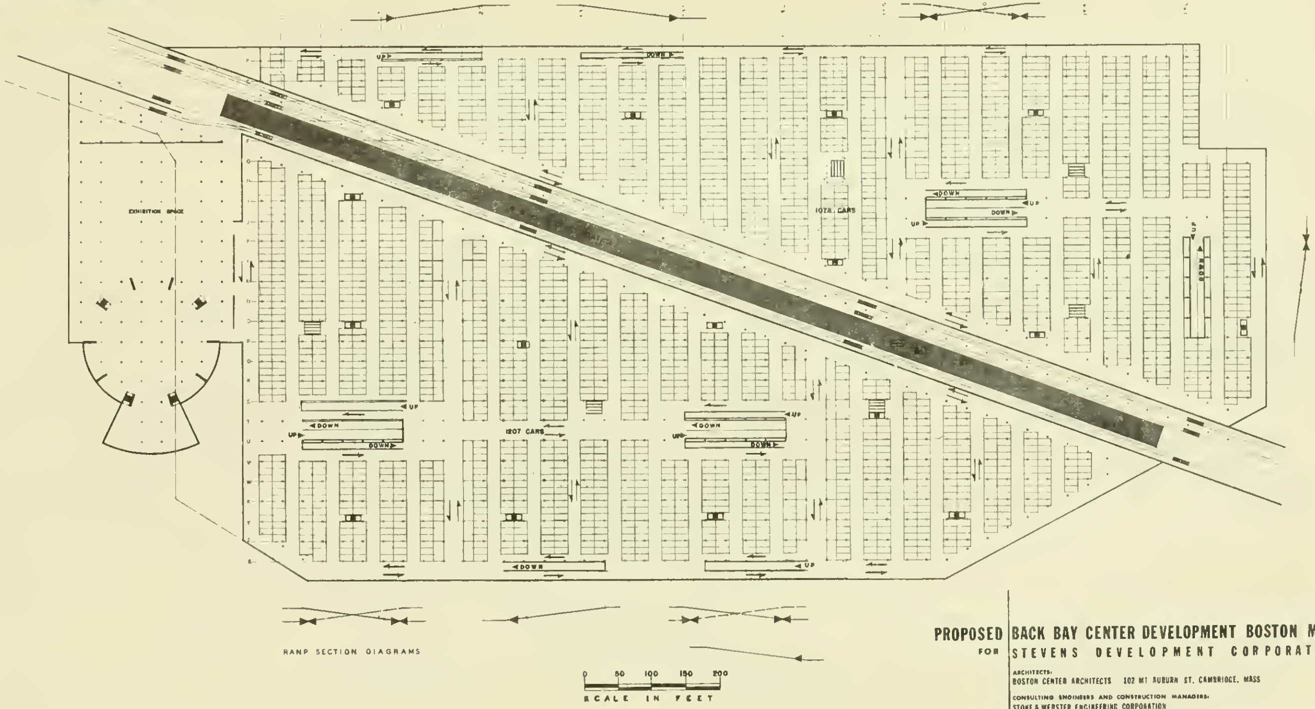


TRACK PARKING LEVEL



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ECONOMIC CONSULTANT:
KENNETH C. WELCH, F.A.I.A

TRAFFIC AND PARKING CONSULTANTS:
WILBUR SMITH & ASSOCIATES
SEPTEMBER 1953

FIGURE 15

INTERMEDIATE PARKING LEVEL

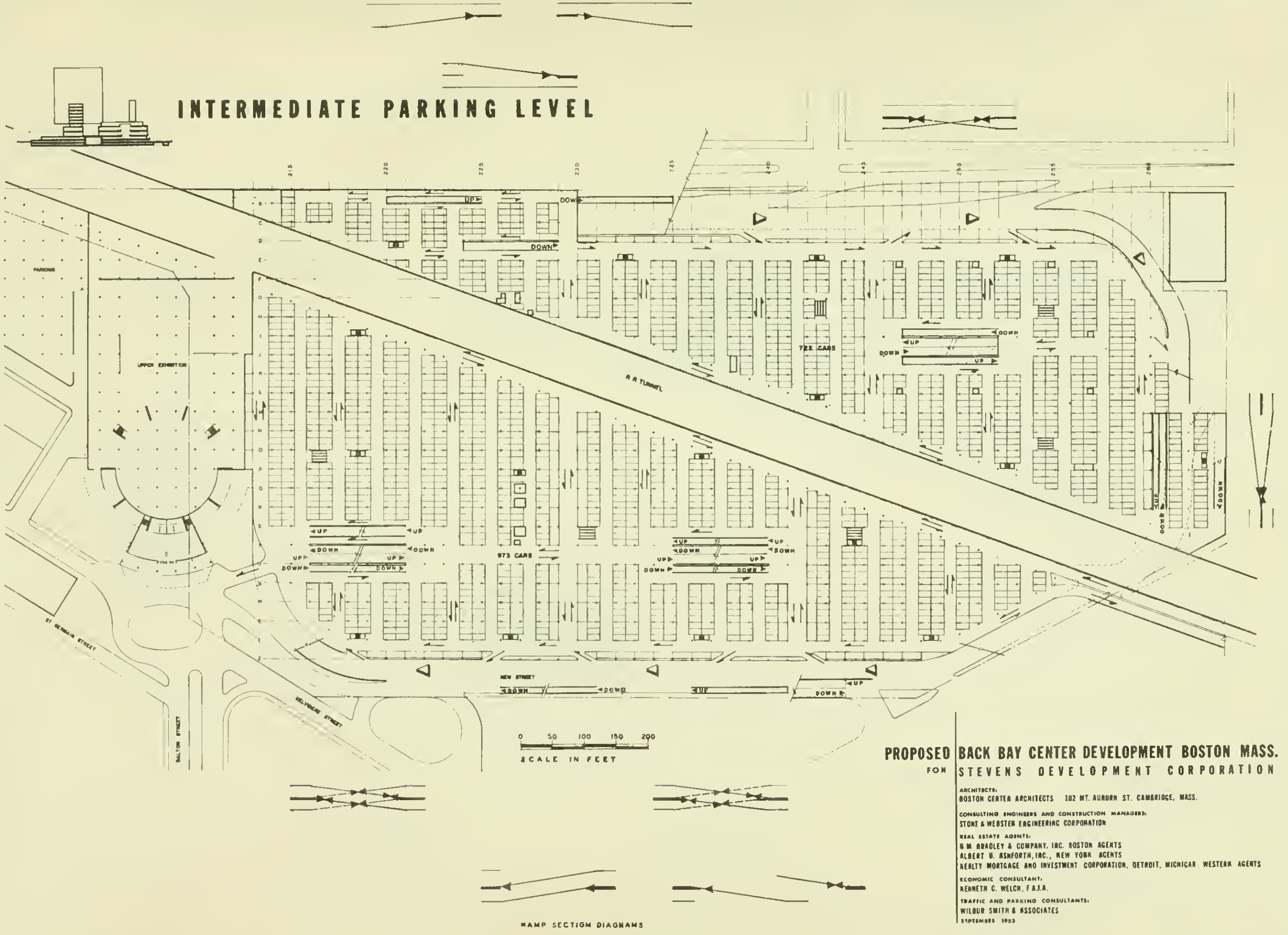

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FIGURE 16

BOYLSTON STREET LEVEL

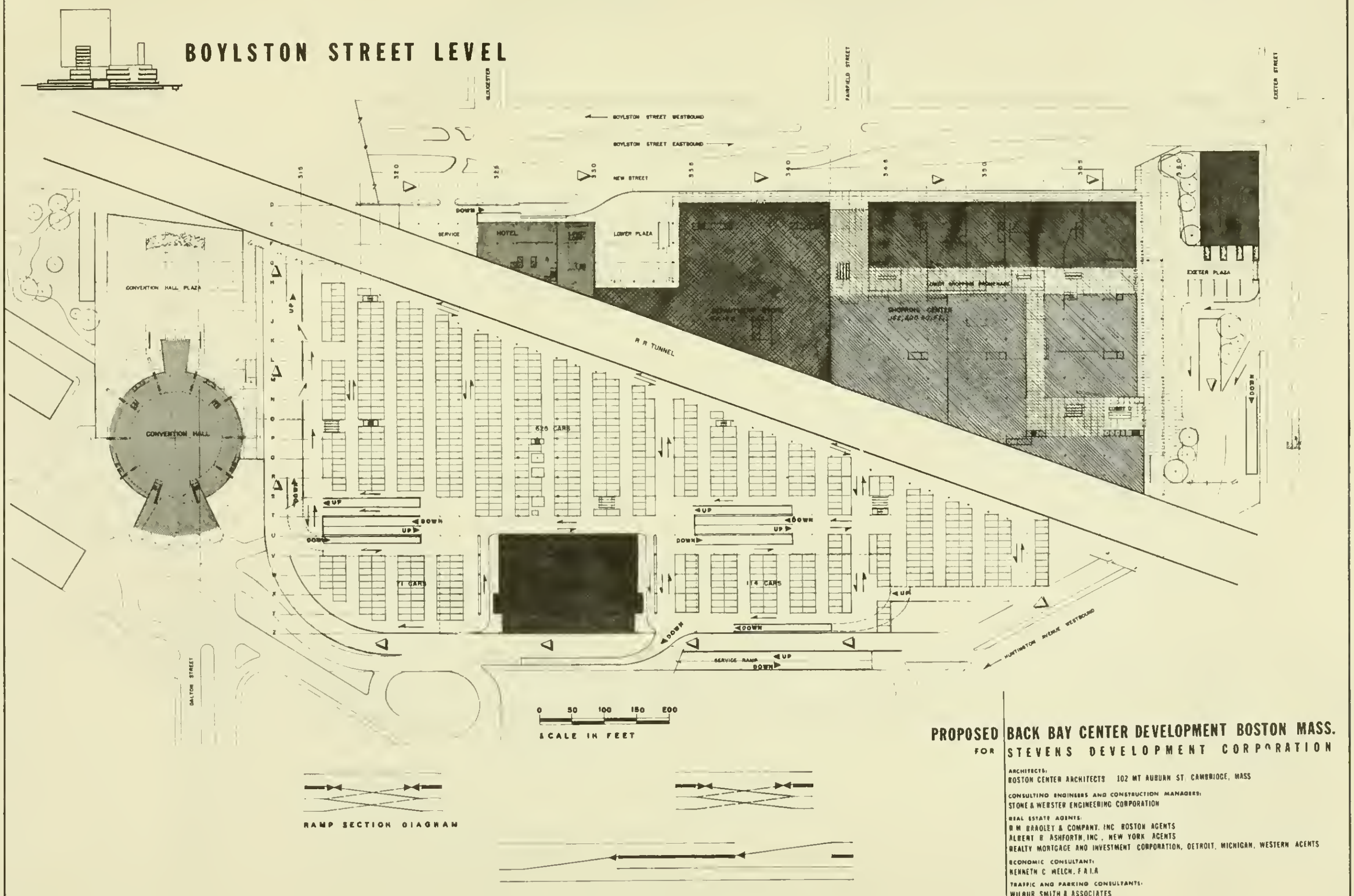

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FIGURE 17

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